Institutionalisation of Climate Policy and Carbon Markets in the Paris-era

Jihyung Joo

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I look back over the past four years, and this PhD journey was definitely a dynamic one. I had to move back to my home country South Korea during the data collection period due to the COVID-19 Pandemic, and many plans were adjusted. I also had to take a short break due to a family illness, and the research progress was unintentionally slow, but fortunately, I was able to continue. Finally, I thank God who kept me safe and healthy throughout this journey so I can come to the finish line.

I started out with an eagerness to know more, and I finish by realising how little I know about this complex world and society. Yet, this incremental step to know a little bit better motivates me to go further ahead as a researcher. I am ready now.

Abstract

Paris Agreement demands a fast and radical change in institutions. It suggests parties to set net-zero goal by 2050. Many have investigated the economic and technological prospects and feasibility of climate actions to reach the Paris goal. However, there is limited attention to the change of social and political dimensions, which is an essential aspect to drive low carbon transformation. The thesis investigated how the institutions of climate policy and carbon markets changed from Kyoto to the Paris period, and evaluated to what extent the climate policy and carbon market is institutionalised to reach the ambitious Paris goal.

Seeing climate policy and carbon markets as socially constructed, which changes through structure-agency interaction, I analysed discourses of policy actors from comprehensive sets of documents and 40 interviews. Based on Discursive Institutionalism, I discovered how the global climate policy and carbon markets changed. I found an incremental change in institutions due to a crash in ideas and powers despite the rise of actors and discourse around climate emergency after the Paris Agreement. Reflecting the change and bounded by broader economic and political context, the global carbon markets became fragmented. Although linking is ideal, Emissions Trading Schemes (ETS) grew heterogeneously and evolved differently due to national institutional environments. In terms of institutional complementarity, South Korean ETS adapted to become regulatory due to its strong state model with incomplete energy market liberalisation while EU ETS is a carbon market that complements its established institutions of decentralised political structure and energy liberalisation. I adopted Historical Institutionalism to view South Korea's net-zero target setting process as that of a transitioning country. Although the change of presidency and majoritarian politics enabled the 2050 net-zero target setting, however, the long-term strategy to achieve a low carbon society is not institutionalised due to the incumbent powers that embrace economic development with low social acceptance.

In the thesis, I found a gap between what Paris Agreement calls for, and what is institutionalised in practice. The reality of climate policy and the carbon market shows that institutions only change incrementally in both global and national levels to a point where it does not reach the speed and degree of climate emergency. The cases show the power collision between the economic competitiveness debate and the climate emergency frame, and shed light on how the climate policy can be restricted by the institutional power. From the Kyoto period, carbon markets remain as the compromise of power struggles, however, it has a limited role to bring radical change. More attention is needed to seek how climate

policy and carbon markets can become socially legitimate, overcoming the conflicts with incumbent policy networks and their powers, which can lead to the institutionalisation to a low carbon society in the Paris-era.

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Abbreviations

ADB	Asian Development Bank
BAU	Business as Usual
CBAM	Carbon Border Adjustment Measure
CCBS	Climate Community and Biodiversity Standards
CCUS	Carbon Capture Utilisation and Storage
CDM	Clean Development Mechanism
CFC	Chlorofluorocarbon
CH4	Methane
CO2	Carbon Dioxide
COP	Conference of the Parties
COVID-19	Coronavirus Disease 2019
EC	European Commission
ECCP	European Climate Change Program
EU	European Union
EUA	EU Allowance
ETS	Emissions Trading Scheme
GDP	Gross Domestic Product
GETS	Greenhouse Gas and Electricity Trading Simulation
GHG	Greenhouse Gas
GNI	Gross National Income
GW	Giga Watt
HFC	Hydrofluorocarbon
HI	Historical Institutionalism
IAM	Integrated Assessment Model
ICAP	International Carbon Action Partnership
IEA	International Energy Agency
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution

IPCC	Intergovernmental Panel on Climate Change
ITMOs	International Transfer of Mitigation Outcomes
JI	Joint Implementation
KAU	Korea Allowance Unit
KCU	Korea Credit Unit
K-ETS	Korean Emissions Trading Scheme
KEEI	Korean Energy Economy Institute
KEI	Korean Environment Institute
KEPCO	Korea Electric Power Corporation
KIET	Korea Institute for Industrial Economics and Trade
KOC	Korean Offset Credits
KPX	Korea Power Exchange
LCGG	Low Carbon Green Growth
LEDS	Long-term low greenhouse gas Emission Development Strategies
MBIs	Market-Based Instruments
MOE	Ministry of Environment
MOFA	Ministry of Foreign Affairs
MOSF	Ministry of Strategy and Finance
MOTIE	Ministry of Trade Industry and Energy
MSR	Market Stability Reserve
MtCO2	Million Tons of Carbon Dioxide
N2O	Nitrous oxide
NDC	Nationally Determined Contributions
NER	New Entrance Reserve
NGO	Non-Governmental Organisation
NPOs	Non-Profit Organisations
NSAs	Non-State Actors
OECD	Organisation for Economic Co-operation and Development
PAA	Policy Arrangement Approach
PFC	Perfluoro Compounds
PCGG	Presidential Committee on Green Growth

PM	Particulate Matter
PMO	Prime Minister Office
PR	Proportional Representation
REDD	Reducing Emissions from Deforestation and Forest Degradation
RES	Renewable Energy Sources
SF6	Sulphur hexafluoride
SO2	Sulphur dioxide
TMS	Target Management System
UNCTD	United Nations Conference on Trade and Development
UNFCCC	United Nations Framework Convention on Climate Change
UK	United Kingdom
US, USA	United States of America
US EPA	US Environmental Protection Agency
VCM	Voluntary Carbon Markets
VCS	Voluntary Carbon Standard

Chapter 1. Introduction

1.1. Background

My journey to navigate the global climate policy and carbon markets field has started a few years ago. I worked as a researcher at the Greenhouse Gas Inventory and Research Centre under the Ministry of Environment of Korea. I was part of the Korean Emissions Trading Scheme (ETS) Taskforce team between 2012-2014. My job was to manage a research project to set standards for new entrance reserve for companies that become compliant with ETS. I also managed a project to set guidelines on how to adjust and cancel the greenhouse gas allowance allocation when there is an operational change in entities. The research output was used to complete the ETS Allocation Plan (2014) before the implementation of the Korean ETS (K-ETS) in 2015. Another duty was to coordinate international cooperative activities with the European carbon market, which was already established. I coordinated several visits and consultation meetings to learn from the European ETS, working with partners like the EU Commission, German, and the UK government.

The Paris Agreement was made in 2015, the year when the K-ETS commenced. Through the work experience in the ETS Taskforce in the Ministry of Environment of Korea, I mainly learned two things beyond knowledge and skills. First, I learned that it is not economic calculation and cost-benefit research that determines the carbon market rules. Rather it is the interaction and negotiation between the government and the carbon market participants that determine and enable changes to the rules. Secondly, I imagined that carbon markets would be linked globally as the K-ETS was designed to match the international standard, facilitated by learning and consultation with other established ETSs. However, carbon markets linking only happened marginally around the world and the K-ETS is not likely to link to any other systems in a foreseeable future. This is where my academic curiosity began.

I wondered how the global climate policy and carbon markets are evolving after the Paris Agreement, and wanted to find out why it is evolving differently from how it was imagined. I wondered whether the world and the people are really getting near to solving the climate change problem.

1.2. Rationale and the Research Questions

The Paris Agreement in 2015 marks a cornerstone in global climate policy. It is evaluated as a political success where persuasion and organisational tactics enabled the agreement of 198 parties (Dimitrov, 2016). The Kyoto Protocol (1997) strived for a legally binding agreement with international enforcement (Sugiyama, 2001) while the Paris architecture is characterised as complex, fragmented, and polycentric (Keohane & Victor, 2011; Green et al., 2014; van Asselt & Zelli, 2014). After the failure of the fifteenth session of the Conference of the Parties (COP 15) of the UNFCCC in Copenhagen (2009) the following climate negotiations resulted in a hybrid structure of top-down and bottom-up approaches. Some are concerned that the Paris Agreement cannot solve climate change as the outcome of the Agreement does not set a long-term goal while lacking justice concerns for sustainable development (Okereke & Coventry, 2016; Spash, 2016). Therefore, ratcheting up climate ambitions through the transparent "pledge and review" process is the key to achieving the Paris goal as not every provision of the agreement has a legal obligation (Bodansky, 2016 ; Jacquet & Jamieson, 2016). In short, the Paris Agreement is "just the beginning of a new regulatory season" (Savaresi, 2016, p.22).

Carbon markets emerged as a political compromise amid the global climate policy gridlock in the Kyoto times with the spread of neo-liberalism in the same period. Carbon markets have grown globally over the years and are still considered an important instrument to reaching the Paris goals (Michaelowa, 2017). There are currently 25 ETSs operating worldwide, and the carbon market is expected to expand over the Paris period (ICAP, 2022). Among the nations that implemented ETS are China, Germany, Kazakhstan, Mexico, New Zealand, South Korea, Switzerland, the United Kingdom, and the EU at the supranational level. Many nations plan to use market mechanisms to reach Nationally Determined Contributions (NDCs) under the Article 6 provision of the Paris Agreement.

Adoption of the Emissions Trading Scheme (ETS) has been studied by many in terms of actors and knowledge networks, and how different interests of some nations and sectors have affected the design (Voß, 2007; Bailey & Maresh, 2009; Braun, 2009). It was interests from powerful players that enabled adoption of ETS in the Kyoto-era as a technocratic project. Moreover, linking was at the core of carbon market establishment in the hopes to create a global trading with its benefits on economic efficiency and institutional lock-in. However, the practice of carbon markets has not been ideal but the social and political realities have been changing the market. The carbon markets grew heterogeneous in design and implementation globally (Wettestad & Gulbrandsen, 2019).

Climate change is a wicked problem where the imbalance of knowledge and power of multiple actors is in tension (Bulkeley & Newell, 2010; Mahony & Hulme, 2018). It is a complex problem owing to uncertainty and spatial and temporal mismatch of the cause and outcome. Climate change knowledge is contested, and its definition and suggested solutions vary according to who the storyteller is (Verweij et al., 2006). Climate policy has less than desirable results because of the wide variation in actors and their interests. The failing practice of the Kyoto Protocol and the Copenhagen conference testified that taking a conventional logic or certain perspective is only partially effective.

The Paris Agreement was born out of the recognition of complexity. It aims to reach low carbon transformation globally which involves decarbonisation of industry (Busch et al., 2018) and energy transition (Chen et al., 2019). The transition should involve change in socio-technological structures, and it demands a complex co-evolution of technological, economic, and social dimensions with speed at the global scale (Chen et al., 2019; Leggewie & Messner, 2012; Shove & Walker, 2007). Yet, there has been less spotlight on how the social and political dimension is developing in climate policy and carbon markets in the Paris-era. Still the discussions on the technological and economic feasibilities of reaching the Paris goals (Hepburn et al., 2020; Tsafos, 2018) and cost benefits analysis of linking carbon markets prevail (Anger, 2008; Edmonds et al., 2021; Riahi et al., 2015).

There has been less attention to how the policy evolves socially and the context in which the policy is embedded. There is a gap in the research to analyse the evolution of institutions in the post-2020 period, and limited information on the development of climate policy and carbon market institutions in transitioning and developing countries under the Paris regime (Dubash, 2021). The study of institutional change and the national institutionalisation of climate policy can help understand and envision the path to reach the Paris goal. This PhD research aims to evaluate to what extent the global climate policy and carbon markets have been institutionalised to transform into a low carbon future.

The thesis is based on the social constructivist approach. Climate policy problems cannot be tested and proven to be true or false, but people construct the meanings of climate policy subjectively in specific social settings (Pettenger, 2007). For example, Knox-Hayes (2010) analysed how carbon markets are socially constructed in the EU and USA. She suggested that the carbon market is a network of ideas and agents, and the power of the market comes from the communication of the social values, building norms that pricing carbon will address climate change (Knox-Hayes, 2010). I seek to understand how people

interpret climate policy and carbon markets and evolve them through the social and political process. It focuses on how they are defined as problems, and how they are framed to be solved and changed in the Paris-era.

Beckert (1999) explored how the markets comprise of institutional structure and agents who are interdependent. However, there is little information on the interaction of the structure and agency in the institutionalisation of climate policy and carbon markets. The thesis explored the structures and agents that construct and change institutions of climate policy and carbon markets at the international level; and in the cases of the EU ETS and the K-ETS; as well as South Korean 2050 carbon neutrality target setting. By combining theories and concepts of Discursive Institutionalism and Historical Institutionalism, I discovered how and why institutions change and evolve in a complex manner through interaction between structure and agents. The thesis also focused on how the interests, ideas, and power struggles of actors are demonstrated within the established structures to change institutions.

Overall, the thesis answers the question of "**How are the climate policy and carbon markets evolving in the Paris period, and to what extent are they institutionalised to transform into a low carbon world?**"

In specific, the thesis addresses three research questions as follows:

- ***How did institutions change in the global climate policy arena from the Kyoto to the Paris period? How is institutional change reflected in global carbon markets and their linking?***
- ***How did K-ETS institutions evolve differently from EU ETS, and what are the reasons for the divergence? What does that imply for achieving the Paris goals?***
- ***How did South Korea set the 2050 carbon neutrality target? What is the role of carbon markets in the carbon neutrality strategy? To what extent is the carbon neutrality agenda likely to institutionalise to transform Korea into a low-carbon society?***

1.3. Approach and Findings

The research was designed to be qualitative, where there was a collaboration with participants to get an insight on the context to answer how and why to a reality. The case study method is used to explore institutional change and capture the process of institutionalisation of climate policy and carbon markets. Policy document analysis and the

40 policy actors' interviews were used to generate comprehensive evidence about the details of the processes and reasons for institutionalisation. Public consultation events were also observed to complement the understanding of multiple policy actors' viewpoints. The cases were presented by themes that emerged in the comprehensive set of written and verbal data.

Based on New Institutionalism theories, the thesis applied unique and novel analytical frameworks to answer research questions in three case studies. Institutional change of global climate policy and carbon markets was explained by the change in actors' discourse in combination with the "ideational power" concept (Carstensen & Schmidt, 2016). The institutional complementarity framework was used to compare how EU ETS and K-ETS evolved adaptively to their own institutional arrangements. Finally, Historical Institutionalism explained how the South Korean 2050 carbon neutrality target and strategy setting were bounded by its political and institutional structures with path-dependency from the developmental state.

The thesis found that the global climate policy arena changed only incrementally from the Kyoto to the Paris period with the layering of institutions due to the clash in actors and their ideational powers. The climate policy and carbon markets evolved to be polycentric and fragmented due to the power struggles and the global political and economic context of protectionism. The heterogeneity of ETS design is also due to the established institutions at national levels. The ETS model adapted differently and performed at different levels of legitimacy in different institutional environments. The thesis also demonstrated that the South Korean pledge under the Paris regime to reach carbon neutrality by 2050 is not likely to institutionalise to transform the country into a low carbon society due to the incumbent institutions that resist change and low social acceptance. The thesis has implications for climate policy in the Paris-era and suggests paying more attention to institutional dynamics when we strive for change.

1.4. Structure of the Thesis

In the following, Chapter 2 reviews the literature on the development of global climate policy and carbon markets in the Paris-era. As background, it also includes how EU ETS was adopted and developed up to the year 2020. Then, literature on South Korean climate policy and K-ETS was reviewed. Through the review, gaps in the literature and theories were identified to generate the research questions. Chapter 3 describes the research design, analytical frameworks and methodology used in the research.

Chapters 4, 5, and 6 are empirical chapters that include three case studies in the following order: institutional change of global climate policy and carbon markets; divergent institutionalisation of the K-ETS from the EU ETS; and the political process of South Korean 2050 carbon neutrality target and strategy setting. These case studies applied distinct analytical frameworks based on New Institutionalism that best describe how institutions mattered in the complex process of institutionalisation. The Chapters report the empirical findings to answer three research questions, and each case was assessed to answer to what extent the climate policy and carbon markets are likely to transform institutions as the Paris Agreement requires.

Finally, Chapter 7 summarises the findings and discusses their empirical novelty and theoretical contributions. It then suggests policy implications and proposes a future research agenda to conclude the thesis.

Chapter 2. Literature Review

This Chapter reviews the literature to formulate the research questions of the thesis. In Section 2.1, literature on the evolution of global climate policy, carbon markets, the EU ETS, and carbon markets linking were reviewed to establish the first objective of the thesis (Objective 1). Section 2.2 documented the information on the development of South Korean climate policy and carbon market to address the research gap, and two additional objectives of the thesis were identified based on the review (Objective 2 and Objective 3). Section 2.3 summarised the overall aim and research questions of the thesis.

2.1. Institutional Change of Climate Policy and Carbon Markets in the Paris-era

2.1.1. Evolution of Global Climate Policy

The evolution of global climate policy since the Kyoto-era has been analysed by many. The Kyoto Protocol (1997) was the first international environmental agreement to address climate change. It was the outcome of the third Conference of the Parties (COP 3) under the UNFCCC negotiations, which was established in 1992 to prevent human-induced climate change by stabilising greenhouse gas concentrations in the atmosphere. Some celebrated the Kyoto Protocol as a breakthrough in climate negotiations with specific targets and timelines, while others argue that it turned out to be weak and ineffective (Bohringer, 2003). The Kyoto Protocol aimed for a top-down approach with mandatory greenhouse gas reductions but encountered difficulties in its development and ratification. There was a divide between developed and developing countries as the former was not willing to take the cost for action, while the latter claimed “differentiated responsibilities” for global emissions. Despite being the largest emitter at the time, the US rejected ratifying the Kyoto Protocol in 2001 as it was concerned about harming its economy. Cost-efficiency became the keyword for climate actions in the Kyoto-era:

> *Whether Kyoto succeeds will depend on how it becomes implemented and especially on whether implementation can be made cost-efficient. (Barrett, 1998, p.27).*

The Kyoto Protocol incorporated the market-based instrument for a cost-efficient response (Bohringer, 2003).

The Kyoto Protocol seemed to be dead after the US withdrew from it, however it evolved over subsequent Conference of Parties (COPs) (Grubb & Depledge, 2001). The COP15 in

Copenhagen (2009) marked a turning point or a “crossroads” of the climate negotiations as it failed to produce a legally binding agreement to succeed the Kyoto Protocol (Hoffmann, 2011). Thereafter, the bottom-up climate architecture was envisioned as a more viable approach in tandem with the rapid rise of emerging emitters from developing parties and the change of geopolitical contexts (Falkner, 2016b). The bottom-up approach became the foundation of the Paris Agreement which was based on the voluntary pledge and review as the basis for climate politics and governance (Falkner, 2016b).

Some have examined the changes in the governance architecture of the UNFCCC regime. The Copenhagen conference proved that the legal agreement on climate policy is unrealistic. Bodansky (2010) characterised the Copenhagen Accord as a political rather than a legal document. In turn, the Paris Agreement is the shift of architecture of the regime, and there has been change in the legal character of commitment and changes in the differentiation between the developing and the developed countries (Bodansky & Rajamani, 2018; Ott et al., 2014). The UNFCCC’s role has expanded to orchestration to steer actions of states as well as Non-State Actors (NSAs) to improve legitimacy, enhance efficiency and effectiveness in the Paris regime (Kuyper et al., 2018).

The global climate policy development is described as a “regime complex” with loosely connected set of various regimes that are decentralised, conflicting or reinforcing each other (Keohane & Victor, 2011). Although a top-down comprehensive approach for climate policy was pursued in the Kyoto times, the polycentric approach has also been suggested (Ostrom, 2009). Falkner (2010) explained how the incremental building blocks strategy emerged after the collapse of multilateralism in climate policy. Over time, the climate governance became polycentric to be described as diverse, multi-levelled, and fragmented (Dorsch & Flachsland, 2017; Jordan et al., 2015). In particular, van Asselt & Zelli (2014) noted the polycentric and fragmented initiatives of global climate policy development and emphasised the coordinating role of the UNFCCC. Green et al. (2014) stressed the balance of top-down and bottom-up approaches of climate policy and suggested cautious and incremental linking of polycentric carbon markets as a way forward in the Paris-era.

The development of ideas and discourse on global climate policy has also been explored. For instance, Bäckstrand & Lövbrand (2007; 2019) analysed the dominant discourses of ecological modernisation, green governmentality, and limited but growing discourse of civic environmentalism from the Kyoto to the post-Copenhagen period. Meckling & Allan (2020) have studied how economic ideas have shaped climate policy through international

organisations from the 1990s up to the post-Paris period. They concluded that the neo-classical ideas in the 1990s have diversified into policy discourses reflecting Schumpeterian and Keynesian ideas that encompass market-based policy and a more interventionist role of states in climate policy.

In the following sections, I reviewed how the carbon markets including EU ETS emerged with the idea of carbon markets linking to find the knowledge gap in the evolution of climate policy and carbon markets in the Paris-era.

2.1.2. Emergence of Carbon Markets

Carbon markets involve trading of greenhouse gas emission allowances that are allocated by a government through an Emissions Trading Scheme (ETS). The idea originated from the Coase theorem (Coase, 1960), which suggested that establishment and allocation of private property rights could help address market failures caused by externalities and to restore economic efficiency (Dales, 1968). In an ETS, the cap limits aggregate emissions to below what would otherwise be produced. Emission reduction targets are achieved when the total allowance is reduced over commitment periods by cuts to the cap. Emitters will need to abate their emissions to match their allocated allowances, obtain allowances by trading or be penalized. The benefit of carbon market is known as cost-efficiency and flexibility in achieving a clear reduction target (Stavins, 1995).

Market-Based Instruments (MBIs) originated from the practice of flexible regulations under the regulatory reform in the US in the 1970s (Voß, 2007). The US Environmental Protection Agency (US EPA) started experimenting with offset mechanism for facility emissions between 1972 and 1975. The flexible regulation linked with growing neo-liberal ideas in the 1980s, developed into practice tradable permits (Voß, 2007). Early examples include experimentation on water quality permits (Hahn, 1989), CFC permit trading, and tradeable development rights for land use (Stavins, 2003). The US EPA also used a cap-and-trade scheme to reduce leads in the gasoline during 1982-1987, demonstrating it as a lower cost way to achieve environmental goals (Schmalensee & Stavins, 2017). Later, the US adopted an SO2 allowance trading program under the Clean Air Act Amendments in 1990. The practice of SO2 trading is the representative example used to promote cap-and-trade as it is argued to have saved $1 billion per year compared to command-and-control strategy (Stavins, 2003). However, some evaluations suggest that it did not achieve the least cost solution because of transaction costs related to uncertainty and low volume of trading (Carlson et al., 2000; Hahn, 1989). Some early practice of MBIs in the US were analysed to

be efficient in phasing out stationary pollutants in the local scale when there was a clear abatement option (Calel, 2011).

Climate change was recognised as a significant global problem from the late 1980s, and MBIs have met the right time as new solution to it (Calel, 2011). The global carbon market was able to emerge owing to the spread of "market environmentalism" at the same period. Market environmentalism refers to the community that is dedicated to conceptualising and disseminating MBIs in environmental governance, entailing neo-classical thoughts to manage natural resources (Bailey, 2007a; Gómez-Baggethun and Muradian, 2015). The academic idea and economic efficiency demonstrated by the US cap-and-trade practices were utilised by the coalition of politicians, academics and other sectors who wanted to minimise the cost of reducing emissions worldwide (Bailey, Gouldson and Newell, 2011; Spash, 2010). By framing the carbon market as efficient solution, the coalition was able to include the market mechanism into the Kyoto Protocol (1997), encouraging nations to adopt as a strategy for climate action (Spash, 2010). The expansion of the carbon market can be viewed as an outcome of the power dynamics. In the climate negotiations, it was powerful nations like the US who pushed the agenda of global carbon market to protect their competitiveness and make developing countries on board.

The practice of market mechanism is also related to increasing involvement of Non-State Actors (NSAs) including industry sector, NGOs, and civil society in the climate change governance. MBIs blur boundaries of governance by involving multiple actors at multiple levels in the design and operation of markets (Bailey and Maresh, 2009; Bulkeley, 2005). The process of negotiation between multiple actors shapes the carbon market design (Bulkeley and Newell, 2010), as seen in the growth of the Voluntary Carbon Markets (VCM) that grew with the involvement of NSAs in climate change governance (Bulkeley & Newell, 2010). The VCM emerged from early voluntary partnerships between market-oriented environmentalists, social NGOs and corporates in the late 1980s. The voluntary internal trading schemes by transnational corporations like BP and Shell in the late 1990s have facilitated adoption of ETS globally (Voß, 2007).

There were voluntary carbon market mechanisms like Clean Development Mechanism (CDM), Joint Implementation (JI) and Reducing Emissions from Deforestation and Forest Degradation (REDD+) which are designed as tradable permits under the Kyoto Mechanism. Amongst them, CDM and JI were used in regulatory ETS in a global scale (Kollmuss et al., 2008). The Kyoto mechanism enables developed countries to invest in clean projects in

developing countries to offset climate obligations. However, the CDM can be seen as a political compromise of the Kyoto Protocol to engage developing countries in action (Barrett, 1998). It involves the developed countries' view that emissions should be cheaper if the developing world were part of the regime (MacKenzie, 2009).

CDM, one of the oldest and the most prevalent constituents of global carbon markets, faced criticism for its validity of the claimed reductions, namely as an additionality problem (Zhang & Wang, 2011). Ethical and social injustice issues were also raised as they are approved according to methodology and institutions set by the North not incorporating the local context (Gilbertson and Reyes, 2009; Spash, 2010; Benessaiah, 2012). Wara (2007) sees CDM as an "inefficient subsidy" while the projects are not practiced on targeted gas or sector with high administrative costs. It is also argued that emissions trading undermines the duty to reduce emissions allowing to avoid responsibility (Sandel, 1997).

Previous studies analysing carbon markets with social science approach are strongly grounded in the post-positivist aspect (Stephan & Paterson, 2012). Many focus on the sociology of markets through the Actor-Network Theory. They see carbon market as an experiment where the actors are engaged in continued reflexive activities to create, frame and operate the market (Callon, 2009; Lohmann, 2009; MacKenzie, 2009). Callon (2009) defines carbon market as "networks of experimentation" where there is on-going critical reflection, negotiation, evaluation, learning by doing through interaction of multiple stakeholders. The multiple actors are engaged in the design and functioning of the market with their own expectations, conceptions, and interests where they promote different structuring and organisation. Moreover, according to Cartel, Boxenbaum and Aggeri (2019) the way field of EU carbon market institutionalised was through the experimental spaces that gave momentum for institutional innovation and change. The in-vivo experiments and the pilot carbon market in the power and industry sectors known as Greenhouse Gas and Electricity Trading Simulation (GETS) led the initiation of the EU carbon market just before drafting the EU ETS directive in 2003 (Cartel et al., 2019).

Likewise, carbon markets are constantly defined and framed by the regulator and market participants (Callon, 2009; Lohmann, 2009; Veal & Mouzas, 2012). Framing involves describing, defining and measurement, and it is constituted, nurtured, and transformed by practices of calculation and governance (Callon, 2009). Framing includes policy design on stringency and optimisation to reach what the market is intended for. Lohmann (2009) asserts that carbon markets were framed as a solution to ecological crisis by internalising

the externalities of climate change into the economy, and it is operated based on the incomplete carbon accounting and cost-benefit analysis. This incomplete process is never-ending and is thus contested and remade. MacKenzie (2009) demonstrated how uncertainties and changing calculation for greenhouse gas measures remain inside the black-box, and how these are framed to be the same in order to be traded in the carbon markets. Meanwhile, Veal and Mouzas (2012) found that there is difference between how the regulators frame the EU carbon market, and how the market participants adopted the frame for the actual practices of the market causing discrepancy. Further, Knox-Hayes (2010) have demonstrated that carbon markets are transnational organisational networks that communicate social values to construct, thus the strength of the institution cannot be determined by the regulation alone.

Climate change is discussed as a wicked problem where the imbalance of knowledge and power is at tension (Bulkeley and Newell, 2010; Mahony and Hulme, 2018). During the neo-liberal paradigm in 20 years of the Kyoto Protocol, powerful parties used the carbon market as a tool to expand their stake in the realm of global climate action. The construction of markets needs to be seen as a matter of coalition building of political forces, of those benefiting from the policy. Carbon markets involve relations of power and its contestations, so institutions are shaped and reshaped (Stephan and Paterson, 2012). Here, the institution refers to constraints that structure political, economic, and social interactions, and include both formal and informal rules (North, 1991). Carbon markets are constructed in a rather complex and messy manner while dynamic agents and politics are at play. For instance, in the UK, Emissions Trading Group (ETG) was set up by business actors to develop a voluntary ETS as an alternative to carbon tax to reduce cost of compliance. In 2002, the government supported the pilot ETS developed by ETG to be an early mover in anticipation of EU ETS and intended to make London a global centre for carbon finance (Voß, 2007).

The politics and governance of global climate policy and the evolution of carbon markets are well documented (Bulkeley and Newell, 2010; Stephan and Paterson, 2012; Wettestad & Gulbrandsen, 2018), as are the social and political processes of constructing carbon markets and their limitations (Wara, 2007; Lohmann, 2009; MacKenzie, 2009). Wettestad and Gulbransdsen (2018) found that domestic politics and institutions mediate the variables of the global carbon markets diffusion. However, there is a lack of information on how domestic institutions and the actors' power dynamics are shaping carbon markets in the Paris-era. There has been little attention on how the policy develops, and the context in which the policy is created and operated (Stephan & Paterson, 2012).

In the following, I reviewed how EU ETS was adopted and developed in the Kyoto-era as the international front-runner.

2.1.3. EU Emissions Trading System (EU ETS)

At the international level, it was actors like Organisation for Economic Co-operation and Development (OECD), the United Nations Conference on Trade and Development (UNCTD), the US-based NGO Environmental Defense Fund, and the International Energy Agency (IEA) who published and advocated emissions trading, which led to the integration of flexible mechanisms like ETS in the Kyoto Protocol (Braun, 2009; Paterson et al., 2014). The EU was an opponent party to the market mechanism when it was adopted in the Kyoto Protocol (Voß, 2007). However, it is interesting to note that the EU officially adopted ETS in 2005 to achieve the EU Burden Sharing Agreement goals after the US withdrew from the Kyoto Protocol. The EU ETS is currently the oldest and the largest carbon market in terms of trading volume and value (ICAP, 2022). It was implemented demonstrating the EU's "leadership by example" in climate policy (Bailey 2007b; Oberthür & Kelly, 2008).

Many have discovered the political aspects of the EU ETS implementation. The EU is a multi-level system with complexity in the policy process involving cooperation and negotiation. There is institutional ambiguity characterised by fluidity with jurisdictional overlap, endemic political conflicts, and varying time cycles (Ackrill et al., 2013; Zahariadis, 2008). The majority voting and the complexity of negotiation expands the room for political actions (Braun, 2009). The ETS was politically feasible compared to adopting a carbon tax (Bailey & Maresh, 2009; Braun 2009). The ETS adoption also became a driver for European integration while dealing with security of energy supply and multilateralism (Oberthür & Kelly, 2008).

Some studies have focused on how actors and their policy networks have enabled the EU ETS implementation. For instance, the consultation and learning from Non-State Actors (NSAs) who had experience with emissions trading and political support from some industries and associations have enabled success in the agenda setting (Braun, 2009). The EU Commission is defined as a policy entrepreneur that enabled ETS adoption by managing the exchange of resources and knowledge and coordinating the negotiations (Braun 2009; Bailey 2007b). Knowledge sharing gave key momentum for establishing and continuing the policy networks to set the agenda, and ETS also fits well with the EU wide accepted principle of polluters' pay and economic efficiency (Braun, 2009).

Early EU ETS design is evaluated to be generous with free allocations due to political compromise and industry lobby (Bailey et al., 2011; Bailey & Maresh, 2009). Over-allocation was also due to administrative realities such as a lack of standards and severe time pressure in setting the allocation plans (Ellerman & Buchner, 2008). In the earlier phases (2005-2012), the allocation process was decentralised in the EU governance, making each state come up with its own cap and allocation rules. In submitting the national allocation plans, each member state had a different stance on projections and allocation methods. The trend was to protect their economic competitiveness against uncertainty minimising political risks (Bailey, 2007b). Early phases of EU ETS showed strong territorialisation as well as sectionalisation (Bailey and Maresh, 2009). States focused more to safeguard their major industries although the international institution of the carbon market was emerging under the UNFCCC framework (Bailey, 2007b). The EU Commission had to accept loosening of the allocation rules like grandfathering and decentralisation to gain actors' cooperation (Bailey and Maresh, 2009). Moreover, some of the energy-intensive sectors that are exposed to the international competition were able to succeed in lobbying to receive free allocations (Bailey, Gouldson and Newell, 2011).

Thus, the EU ETS carbon price was very low from the beginning, and in Phase 2 (2008-2012), it experienced a further price drop due to the financial crisis, over-supply of international carbon credits, and conflicts and overlaps with other policies like renewable policies that stimulate Renewable Energy Sources (RES) (de Perthuis & Trotignon, 2014; Fankhauser et al., 2010; Koch et al., 2014). The governance of the EU ETS tends to overestimate the cap and allowances (de Perthuis and Trotignon, 2014), and unpredictable outbreaks like the economic crisis affected market functioning. Moreover, regulatory uncertainty and lack of credibility impacted the EUA price, disrupting the delivery of long-term cost-effectiveness (Koch *et al.*, 2014).

The price fall of EU ETS has given evidence that the scheme was inefficient due to its structure and design. The EU Commission framed the drawbacks as a learning process and attempted to evolve the scheme through structural reform in 2012. Moving on from errors made by loosening the policy design, the EU Commission consolidated its political authority through centralisation (Bailey & Maresh, 2009) and tightening the standards from phase 3 (2013-2020). Historically, the EU governance evolved from several trials and errors to find a balance of hierarchical or cooperative status with various interests from member states and NSAs from the 1950s (Tömmel, 2016). LaBelle (2012) evaluated the EU ETS as

hierarchical governance with a single market and legal-based mechanisms, while power is delegated to the EU Commission based on prior negotiations and legislative activities.

The reform of the carbon market could be done through quantity adjustments like back-loading or a rule-based price management mechanism like a soft cap (price ceiling or floor) as hybrid mechanism to ETS (Fankhauser et al., 2010). However, the EU had mainly taken quantity adjustments as the price management mechanisms were politically contentious at the EU level (de Perthuis & Trotignon, 2014). The reform included back-loading, limited use of international offset credits from phase 3 (2013-2020), and established Market Stability Reserve (MSR) that operates to control the supply of the markets. It enables storing, releasing, and cancelling credits in the reserve to control the market supply. Further, the EU Commission started the legislative process for phase 4 (2021-2030) in 2015 to increase the linear reduction factor of cap from 1.74% to 2.2%. The adoption of MSR is a significant improvement in design (Javnaker & Wettestad, 2017), however, some evaluate that the quantity-based market stability measures are a product of political compromise, and the short-term measure is not sufficient to solve the over-supply problem (Marcu & Elkerbout, 2015; Perino & Willner, 2017; Taschini, 2013).

The EU ETS is a front-runner in carbon markets, and other markets that followed have been influenced by it (Wettestad & Jevnaker, 2018). Other carbon markets learned from the EU ETS failures and reforms, so it is important to understand how its design has come about and evolved over time. Overall, EU ETS is shaped by the interaction of internal and external factors involving the political process of negotiation and compromise of the policy actors.

2.1.4. Carbon Markets Linking

Many nations and jurisdictions have adopted ETS, and some have made attempts to expand the market through linkages (ICAP, 2022). ETSs are linked if one system's credit can be directly or indirectly used for compliance in another system (Ranson & Stavins, 2012). International linkage of carbon markets is expected to be beneficial to emissions reduction and cost savings (Anger et al., 2009). It can reduce competitive distortion (Alexeeva & Anger, 2016) and improve liquidity (Flachsland, Marschinski and Edenhofer, 2009; Ranson and Stavins, 2012) while politically demonstrating climate change leadership and facilitating international cooperation (Flachsland et al., 2009). Linkage can also provide regulatory stability, and linking heterogeneous systems can give political flexibility (Bodansky et al., 2016; Tuerk et al., 2009). In summary, international carbon market linkage is known to improve the economic functioning of carbon markets by reducing market

power and price volatility (Bodansky et al., 2014). Moreover, industrial competitiveness issues can be solved through globally harmonised governance.

On the other hand, there are risks associated with carbon market linkage. There could be distributional welfare impacts (Flachsland, Marschinski and Edenhofer, 2009; Ranson and Stavins, 2012). For instance, in the system with the higher price, installations with higher abatement costs will benefit, while those with lower abatement costs will be hurt by the linkage. There can be an additionality and credibility problem, as well as concerns with losing government's control over the policy (Ranson & Stavins, 2012). Hence, the smaller system can be exposed to risks such as price fluctuation due to the larger system with unexpected impacts. Interdependent price formation and volatility can be observed (Green, 2017). There are sceptics about linking carbon markets since it is difficult to manage double counting issues (Bodansky et al., 2016) without one market controlling organisation. The transfer of emissions obligations raises concerns about environmental integrity and justice (Mehling et al., 2018). Overall, international linkage can be challenging as it involves political, institutional, and economic factors with capital flows between nations, and differences in design and price that can affect the overall policy outcome.

Most of all, barriers to carbon market linkage come from different political priorities and divergent institutions. Design divergence was observed in the global carbon markets with adjustments in design reflecting local political and administrative goals (Gulbrandsen et al., 2019). ETS designs diverged globally due to domestic politics, adaptation to the local political contexts, learning, and lack of international standards (Wettestad & Gulbrandsen, 2019). The history of carbon markets has shown that there is the power of coalition involved in constructing the carbon markets, and institutions shape the relationship between the policy making and interest groups. Thus, linkage of carbon markets also involves changes in the power dynamics as it can alter incentives within systems, and the design can be modified.

There are few empirical cases of carbon market linkage so far. Tuerk et al. (2009) analysed the absence of institutional structure for the governance of international carbon market linkages. Much cooperation for linking has been informal to date, involving policy learning and the exchange of information. It was natural to envision a globally linked carbon market in the Kyoto times as ETS originally developed as a means to reduce global emissions within the UNFCCC framework. However, bi-lateral carbon market linking has been limited to California-Quebec, Norway – EU, Switzerland – EU and the UK - EU, while many uni-lateral

linking has been attempted to date. Most of the established uni-lateral links were to the CDM in the Kyoto-era.

In the following, I identified the gap in the literature to scope global climate policy and carbon markets with an institutionalist view and indicate the first objective of the thesis (Objective 1).

2.1.5. Institutional View on Global Climate Policy and Carbon Markets: Objective 1

The global climate action is described as slow or stagnant experiencing "institutional inertia" due to costs, uncertainty, path-dependence, power, and legitimacy (Munck af Rosenschöld, Rozema and Frye-Levine, 2014). At the same time, many still put hope to stop climate change, and urge for a swift and dramatic change in the Paris-era (Figueres et al., 2017; Tsafos, 2018). What the Paris Agreement ultimately aims for is the transformation to the low carbon world. Low carbon transformation involves a complex process as it is a "radical process with regards to impact, range but take place slowly over several decades" (Leggewie & Messner, 2012, p.3). The climate governance challenge lies in the coordination, mediation of interests and strategy setting in the transformation, and they require institutional solutions (Dubash, 2021).

Although the climate policy and carbon markets evolution have been sketched, the literature did not pay much attention to the dynamic change caused by institutional structure and their interaction with policy actors. In light of the Paris Agreement, many highlighted the economic and technological feasibilities of climate actions to reach the Paris goals (Hepburn et al., 2020; Tsafos, 2018) or provided prospects for the future possible architecture of carbon markets (Bodansky et al., 2016; Mehling, Metcalf and Stavins, 2018). However, they have limited attention to the institutional environment where the theory works or make assumptions on universal validity (Gustafsson, 1998). Social and political change is essential for driving low carbon transformation. Ostrom (1990) argues that the key to the environmental problems is "getting the institutions right" with broad social acceptance and entailed rules, rather than finding an optimal design as best practice.

Institutions matter in trying to deal with a wicked problem like global climate change. Institution refers to constraints that structure political, economic, and social interactions, and include both formal and informal rules (North, 1991). Institutions encompass regular patterns of behaviour, rules and norms, and the relationship that influence behaviour. It is about how people establish targets and set rules, including monitoring and control of the

outcomes (Vatn, 2015; Vatn, 2018). So even with the same design, the climate policy and carbon markets can work differently in different institutional environments (Bergquist et al., 2013; Gustafsson, 1998; Ostrom, 1990).

Environmental governance is defined as the establishment, affirmation, and change of institutions to resolve environmental conflicts (Paavola, 2007). Climate change governance is changing, and it is not a simple movement from a state-led regulation to the market. Although the state seems to have transferred responsibilities to NSAs in the neo-liberal regime, the state still has an important role in initiating and managing the market (Castree, 2008). According to Ostrom (1990), institutions are rarely private or public, and the productive solution to the environmental problem comes from intertwined mixture of institutions. This implies a complex governance structure that involves layering and overlap of institutions (Paavola, 2007).

The practice of carbon markets in the past has shown that applying the market concept to environmental problems is different from its theoretical model. Firstly, there is complexity and interdependence in the environment that makes it challenging to define it as an externality (Gustafsson, 1998 ; Paavola, 2007; Vatn, 2010). Environmental problems involve high transaction cost, so they cannot be solved by merely internalising externality. In terms of greenhouse gases, the complexity arises from the challenge of identifying and characterising non-stationary source emissions, and the uncertainty in their measurement (MacKenzie, 2009; Spash, 2010). Moreover, the climate change regime is extended to the global level, and the causes and consequences of emissions are interdependent on a larger scale (Vatn, 2010). The history of carbon markets shows that climate change is a very different kind of pollution than the ETS was designed to solve (Calel, 2011).

Carbon markets are socially constructed, and they involve relations of power and its contestations, so institutions change dynamically (Stephan & Paterson, 2012). Beyond flexibility and efficiency logic, the carbon market is built and expanding through policy networks that promote it. For example, it was the coalition of some powerful states and experts that pushed the agenda of the carbon market to the international climate discussions. In the national implementation, it was domestic industry and other sector voices that moulded the stringency and rules of the market (Bailey et al., 2011). Thus, the construction of the market needs to be seen as a matter of actors and their political forces in the institutionalisation. The politics of carbon market entail managing various tensions

between different actors, including stringency of targets, environmental integrity, and linkages to other markets (Paterson, 2012).

Addressing the gap, the first objective is to investigate how institutions changed in the global climate policy arena from the Kyoto to the Paris period and to describe how the institutional change was reflected in the global carbon markets and linking (Objective 1).

In the following section, I explain the background knowledge of the South Korean climate policy and carbon markets and point out the missing information in the literature to introduce two other objectives of the thesis (Objective 2 and Objective 3).

2.2. South Korean Climate Policy and Carbon Market in the Paris-era

The Paris Agreement does not provide a formal framework for governance, accountability, and reporting on reaching the goals. Some are concerned that the existing pledges and measures are not enough to deal with the scope and timing of the Agreement (Deutch, 2008; Geiges et al., 2020). Much climate policy literature points out that the Paris Agreement is only the start of a new path, and the importance lies in the transparency mechanism in the pledge and review process (Falkner, 2016b; Raiser et al., 2022; Rogelj et al., 2021). It also stresses the orchestrating or coordinating role of UNFCCC governance (Kuyper et al., 2018) with the need for the peer pressure mechanism from various actors to ratchet up the process. Therefore, the climate policy under the Paris regime demands close review and monitoring at the national levels.

South Korean climate policy and carbon markets are a distinct case worth reviewing because it was a non-Annex 1 party during the Kyoto-era and became a developed country in the Paris-era. It defined its role as a bridge between developing and developed countries from the Kyoto period and promoted itself as a pioneer of climate policy (Han, 2015). South Korea continues to remain a leader in the Asian region under the Paris regime through measures such as the 2050 carbon neutrality setting and the Korean Green New Deal (The Government of Korea, 2020b). In the following, I review how the South Korean climate policy and carbon market, ETS have developed since the Kyoto period to highlight the gap in the literature.

2.2.1. South Korean Climate Policy and Korean Emissions Trading Scheme (K-ETS)

The evolution of social and political dimensions of Korean climate policy has been documented since the Kyoto Period. For example, Byun (2010) applied Advocacy Coalition Framework to analyse that there were two opposing political party-government-NSA

coalitions in Korean climate change policy. The coalitions were defined as pro-environment and pro-market coalitions on opposite ends that caused delays in legislation related to climate change since the Kyoto Protocol. They are also named as environmental and growth alliance networks, and Yun et al. (2014) found the government organisations were the most influential in climate policy, managing the networks while the growth network tended to be stronger in their ties. Kim (2012) asserted that it has been the Ministry of Trade, Industry and Energy (MOTIE) that led the policy measures up to the Kyoto Protocol, as Korea stresses economic development with emphasis on industrial growth. It was through the Prime Minister's Office (PMO) and the MOTIE that drafted the National Climate Change plan (2005-2007) in the Kyoto times, and the Ministry of Environment (MOE) constantly raised opposition to the stringency of targets and the design of climate policy instruments.

Many have also documented how the Low Carbon Green Growth agenda was set through a strong political drive of President Lee Myung-Bak (term 2008-2013). President Lee framed "Green Growth" as the political slogan for his presidency and was fond of market-based instruments that can facilitate economic efficiency while reaching the environmental goals. However, the green growth agenda constantly faced challenges from various actors, including government agencies, industry, and civil society. The conflict became visible in the legislative process of the Framework Act on Green Growth in January 2010, which indicated the possibility of adopting ETS as the policy instrument. The Act did not specify the managing organisation for the policy instrument, resulting in competition between the MOTIE and the MOE to be the competent body, and jurisdictions lobbying to host the exchange in anticipation of ETS implementation (Han & Yun, 2011). It was the Presidential Committee on Green Growth (PCGG) that acted as the mediator who tied and moderated two distinct policy networks through hierarchical power (Han & Yun, 2011; Byun, 2010).

The agenda on green growth was criticised for watering down sustainable development to business opportunity and excluding civil society's consultation in the agenda setting (Yun & Won, 2012). It was evaluated to be a rather top-down and one-way implementation with a lack of communication and legitimisation to the society (Yun and Won, 2012; Kim, 2012). Kim (2012) argued that the agenda was a hasty political decision as Korea was not ready to accept green growth and market mechanisms for environmental policy, as there was no public awareness or agreed norm within the society, such as the polluters pay principle. Further, the agenda was criticised by civil society for including nuclear power development as one of the main strategies to mitigate greenhouse gases (Kim, 2012).

Others have analysed how the K-ETS was adopted through the policy networks in the political process (Han & Yun, 2011; Hermanns, 2015; Heo, 2015; Oh et al., 2017). Korea implemented national ETS in 2015 as a means to reach the ambitious goal of reducing emissions 30% below Business-as-Usual scenario by 2020. There was international pressure as Korea's rapid economic growth resulted in the fastest rate of emissions increase among the OECD countries. The President Lee Myung-Bak administration (term 2008-2013) recognised the need to cope with the international as well as inner pressure to show leadership as a rising economy after financial crisis (Hermanns, 2015). Moreover, growing civil society voiced continual concerns about the environment, pushing the industry to play a key role in mitigation (Heo, 2015). The suggested policy solution was the construction of the logic that ETS can achieve both goals of keeping steps of the growing economy and reducing greenhouse gases. It also aimed to engage the industry sectors through economic efficiency logic.

Korea was able to mandate the Act on Allocation and Trading of Greenhouse Gas Emissions (ETS Act) in 2012 owing to the strategic governance architecture (Oh et al., 2017). Anticipating high policy conflicts, the K-ETS governance structure was strategically set with multi-government authorities under the PCGG as a control tower to drive the agenda in a fast and powerful manner. It was also the majoritarian politics that enabled the initiation of legislation in 2010 as the Presidential party had a slight majority of seats in the National Assembly (Heo, 2015). The ETS Act was legislated through a majority vote of 140 out of 190 Parliamentary members, even though it was criticised as the major party's dominant play without proper adjustments with opposing parties in the process (Kim, 2012).

Due to the polar pressure from pro-environment and pro-market coalitions, the ETS design was compromised through provisions like free allocation in the first phase and setting the MOE as the competent ministry. The policy window for ETS adoption was opened by softening the policy measure, making the design more acceptable to multiple stakeholders (Heo, 2015; Oh et al., 2017). Due to the compromise, many design issues remained in implementation (Park & Hong, 2014). Thus K-ETS phase 1 (2015-2018) is evaluated to be over-allocated with free allocations, and over-supply was intensified due to early government interventions (Lee & Yu, 2017). It experienced illiquidity with a low carbon price in the early practice (Etienne & Yu, 2017). The government intervened to activate the market through the market stability reserve by changing the borrowing rules and by controlling the offsets (Asian Development Bank, 2018).

K-ETS changed to tighten the stringency and activate the market with liquidity from phase 2 (2018-2020). The change of policy and competent authority coincided with the change in presidencies and the turnover in the major political parties of the National Assembly (Oh et al., 2017; ADB, 2018). For example, President Moon Jae-in (term 2017-2022) belongs to the democratic party, which used to be the pro-environment coalition networking with the MOE and civil societies on climate issues, whereas the previous President Park Geun-hye (term 2013-2017) and her major conservative party was characterised as the pro-market coalition (Table 2.1).

Item	**Planning Stage (2012-2015)**	**Phase 1 (2015-2017)** *Change made in 2016	**Phase 2 (2018-2020)**
Establishment of the national GHG target and the performance management	Ministry of Environment	Prime Minister's Office	Prime Minister's Office (coordination) Ministry of Environment (development)
Management of the national GHG emissions statistics	Ministry of Environment	Prime Minister's Office	Ministry of Environment
K-ETS Basic plan development	Ministry of Strategy and Finance Ministry of Environment	Ministry of Strategy and Finance	Ministry of Strategy and Finance Ministry of Environment
K-ETS Allocation plan development	Ministry of Environment	Ministry of Strategy and Finance	Ministry of Environment
K-ETS Operation in allocation	Ministry of Agriculture, Food, and Rural Affairs; Ministry of Environment; Ministry of Land and Infrastructure Transport; and Ministry of Trade, Industry, and Energy	Ministry of Agriculture, Food, and Rural Affairs; Ministry of Environment; Ministry of Land and Infrastructure Transport; and Ministry of Trade, Industry, and Energy	Ministry of Environment
K-ETS Operation in emissions certification	Ministry of Agriculture, Food, and Rural Affairs; Ministry of Environment; Ministry of Land and Infrastructure Transport; and Ministry of Trade, Industry, and Energy	Ministry of Agriculture, Food, and Rural Affairs; Ministry of Environment; Ministry of Land and Infrastructure Transport; and Ministry of Trade, Industry, and Energy	Ministry of Environment

Table 2.1. Change of the competent authority of the K-ETS. Referenced and updated from Asia Development Bank (2018). There were changes in the policy implementation structure that overlap with the presidential changes in 2013 and 2017.

2.2.2. Institutional View on Korean Climate Policy and K-ETS: Objective 2 and 3

The evolution of climate policy has been investigated at national or jurisdictional levels (Agrawala & Andresen, 2010; Dubash & Joseph, 2016; Hildén, 2011; Oberthür & Kelly, 2008), as has the evolution of the carbon markets worldwide (ICAP, 2022; Wettestad & Gulbrandsen, 2019). In particular, Wettestad and Gulbransen (2019) investigated various ETSs including the EU, the Regional Greenhouse Gas Initiative in the US, California, Tokyo, New Zealand, Australia, South Korea, Kazakhstan, China, and demonstrated that the carbon markets implementation and design diverged globally due to varying degrees of policy diffusion, domestic politics, and institutions.

There is a limitation in the research on the geographical focus, as most of the empirical studies are based on the Western experience. Many studies of carbon markets from a political and governance perspective have focused on the EU ETS adoption and its design (Bailey, 2007b; Bailey et al., 2011; Bailey & Maresh, 2009; Gulbrandsen et al., 2019; Paterson, 2012; Stephan & Paterson, 2012; Voß, 2007). Moreover, attempts to see the carbon market with an institutionalist lens are limited to examining of non-regulatory organisations in the US and EU carbon markets (Knox-Hayes, 2010) and discovering institutional innovation and institutional work before the EU ETS was adopted (Cartel et al., 2019). As climate change is a global issue, there is a knowledge gap on how other cultures and regions are normalising carbon market institutions, especially under the Paris regime.

Wettestad and Gulbransen (2019) documented how ETS designs have diffused with divergent designs globally, but they did not take an institutionalist view on the matter, and it does not include the system evolution in the post-2020 period. Biedenkpf and Wettestad (2018) found that the design and implementation of K-ETS were influenced by the EU ETS through learning and emulation, evidenced by activities like the EU-Korean ETS cooperation project, multiple technical workshops, and exchange of information before and during ETS implementation. At the same time, they evaluated that it was the domestic factors that determined the core ETS design and predicted that the policy development could be changed after the change of President in 2017.

Korea ETS was implemented in 2015 as the second largest mandatory carbon market after the EU ETS at the time (ICAP, 2022). As the first mandatory ETS established in the East Asia, it has the potential to establish a carbon market model for other Asian countries to learn from as they share some common institutions (Biedenkopf & Wettestad, 2018). The K-ETS is also comparable to the EU ETS as they both used ETS as a main tool to manage energy

and industrial process sectors. Although the size and stage of development for carbon markets are different, they both set 2050 net-zero targets and aim to use the carbon market as one of the main means to achieve the Paris goal.

Therefore, the second objective of the thesis is to explore how K-ETS is implemented and explain why it is evolving differently from the earlier EU ETS model. In doing so, I aim to examine to what extent the ETSs are institutionalised to reach the Paris goals in the post-2020 period (Objective 2).

The IPCC published a special report in 2018 suggesting that setting a net-zero emission target for 2050 is necessary to meet the 1.5˚C goal. Net-zero, or carbon neutrality, is achieved through balancing CO2 emissions in the atmosphere and their removal into sinks. As of 2022, 136 countries out of 198 Parties of the Paris Agreement are discussing, have declared, or legislated a net-zero emission target (2022)[1], covering 83% of global emissions. This includes Leading economies such as the EU, the US, China, and Japan, which declared their net-zero targets in 2020. Höhne et al. (2021) analysed that future climate change can be substantially alleviated if countries establish credible and consistent long-term net-zero targets. However, it is still uncertain whether the globe is on track to meet what the Paris Agreement demands. Vague claims of net-zero targets without a clear scope, fairness, and a concrete roadmap would hinder the pathway to the climate goal (Rogelj et al., 2021). The credible net-zero targets and strategy setting require a robust framework encompassing social, political, and economic spheres in the process (Fankhauser et al., 2021).

Although the importance of the pledge and review framework of the Paris regime is emphasised, there are limited empirical cases that investigate the evolution of climate institutions at national levels under the Paris regime (Dubash, 2021). Dubash (2021) explained that climate institutions emerge based on the interplay between national political institutions, international drivers, and existing bureaucratic structures, and pointed out that there is limited insight into how nations are institutionalising mitigation policies within their political and institutional structures. Few works of literature examine the political process of how in-transition and developing countries are constructing climate policy under the Paris regime (Dubash, 2021), and there is a lack of information on to what extent the climate policy is compatible with their institutions. Empirical cases are missing to demonstrate the domestic process of institutionalising the 2050 net-zero strategy setting,

[1] https://zerotracker.net/

as well as evaluating their progress towards the low carbon transformation. Limited attention has been given to showing how transitioning and developing countries have set the net-zero strategy.

Some have researched the role of international carbon markets under the net-zero framework and analysed how they could help reach the target efficiently (Edmonds et al., 2021; Yu et al., 2021). However, there is little information on the role of the carbon market in the 2050 carbon neutrality setting at the national level.

In South Korea, the ETS law was legislated in 2012 under the Low Carbon Green Growth initiative, and K-ETS was implemented in 2015 as the primary tool to mitigate greenhouse gas covering over 70% of the national emissions. ICAP (2022) pointed out that ETS is an important policy instrument in the portfolio for the net-zero transition. Hence, the government of South Korea has announced that it will make ETS an essential means to reach the 2050 carbon neutrality goal by strengthening its carbon market allocation methods and supporting low carbon technology (The Government of Korea, 2020b).

In this light, the third objective is to discover how South Korea set its 2050 carbon neutrality target as a transitioning country and determine the role of carbon markets in the strategy. It also aims to evaluate to what extent the carbon neutrality agenda is likely to become institutionalised transforming Korea into a low-carbon society (Objective 3).

2.3. Summary: Aim and Research Questions

The aim of this thesis is to understand how the institutions of climate policy and carbon markets have changed from the Kyoto period to the Paris period. After navigating how the international climate policy institutions have evolved, the K-ETS is compared to the EU ETS to investigate how different structures and agents are institutionalising carbon markets at national and jurisdictional levels. The thesis will also examine how the ambitious 2050 carbon neutrality target was set in the transitioning country of South Korea, shedding light on how domestic politics and institutions influenced the development of the target and strategy setting. The role of carbon markets in the carbon neutrality setting will be assessed, as well as the potential for South Korea to transform into a low carbon society. Overall, the thesis aims to evaluate to what extent the climate policy and carbon market have become institutionalised to reach the ambitious goal of the Paris Agreement to solve one of the most imminent problems of the earth, to stop climate change.

The research questions that the thesis aims to answer are as follows:

How have the climate policy and carbon markets evolved in the Paris period, and to what extent have they become institutionalised to transform into a low carbon world?

1. ***How did institutions change in the global climate policy arena from the Kyoto to the Paris period? How is the institutional change reflected in the global carbon markets and their linking?***
2. ***How did K-ETS institutions evolve differently from the EU ETS, and what are the reasons for the divergence? What does that imply to achieving the Paris goals?***
3. ***How did South Korea set the 2050 carbon neutrality target, and what is the role of carbon markets in the carbon neutrality strategy? To what extent is the carbon neutrality agenda likely to institutionalise to transform Korea into a low-carbon society?***

Chapter 3. Research Design and Methodology

Chapter 3 explained the research design in Section 3.1, and how analytical frameworks were built to apply in the three following empirical Chapters in Section 3.2. Section 3.3 described the method used to collect and analyse data, and Section 3.4 discussed research ethics, practicalities, and limitations.

3.1. Research Design

In the philosophy of science, the notion of "social constructivism" originated from opposing realism (Sismondo, 2010). Realism grew in the late 20th century believing that scientific research and its progress can get close to the truth or what is real. Social constructivism diverges from the positivist view that science exhaust by empirical and logical considerations of what would verify or falsify (Sismondo, 2010). In contrast, constructivists see science and technology as social, active, and not natural (Sismondo, 2010). Institutions are social realities that exist because of people's actions, attitudes, and their talk. In this view, the world is producing reality continuously so the reality can be contested. The constructivist view aligns with the complexity of real-world science and have the potential to contribute to public policy and governance problems in that aspect (Sismondo, 2010).

Many climate change and environmental policy issues can be analysed based on the constructivist view since there is substantive uncertainty in knowing the cause and outcome of the complex problem, while contested knowledge and solutions come and go. Uncertainty is closely related to defining and framing of climate change or how we make sense of the problem. Institutional change prevails in situations of high uncertainty with the process of institutional re-embedding through actors' strategies (Beckert, 1999).

Further, politics and power work to make the use of knowledge for their pursuit of interests due to uncertainty (Demeritt, 2006). Knowledge of climate change is co-produced by humans with complex cultural politics (Mahony & Hulme, 2018). For example, the IPCC is a world parliament of specialists (Callon, 2009) who constantly negotiate the content with decision makers and vote on the contested scientific knowledge. Knowledge framing is constructed within such institutional spaces (Mahony & Hulme, 2018). At the state level, Haas (2004) explained that constructivism has evolved to set the core assumption that knowledge is asymmetrically distributed between states, and state behaviours are affected

by the distribution of power, knowledge, and formal institutional properties. The "epistemic communities" transmit new knowledge to policy makers, connecting the knowledge with power (Haas, 2004).

In other words, the way global climate policy and the carbon market are institutionalised can be viewed as constructivist as it is the international negotiation of diverse actors and the dominant discourse that drive the direction of climate action. It is also about the ideational power that is embedded in the discourses. For instance, it was through the Kyoto Protocol and the IPCC report that introduced the market mechanism for mitigation. The discourse of powerful agents like the US and the EU brought the idea of global carbon markets to the UNFCCC table shortly after it started to spread as a good idea to solve the problem of climate change.

To capture the dynamics of change in climate policy and carbon markets in the Paris-era, the study focuses on the interaction between diverse actors and their communication and negotiation. This interactive space highlights how actors interact and frame to produce compromise or friction for change (van Wijk et al., 2019) in the governance system, illustrating the relationship between the institutional structure, context, and agency.

3.2. Analytical Framework

3.2.1. Theoretical Background: New Institutionalism

To explore how climate policy and carbon markets are institutionalised, the thesis employs theoretical concepts of New Institutionalism as its framework. New Institutionalism developed "in reaction to the behavioural perspectives that were influential during the 1960s and 1970s and all seek to elucidate the role that institutions play in the determination of social and political outcomes" (Hall & Taylor 1996, p.936). The term institution refers to "a social order or pattern that has attained a certain state or property; and institutionalisation denotes the processes of such attainment" (Jepperson, 1991). Institution includes regular patterns of behaviour, rules and norms, as well as relationship that influence behaviour. Rules can be formal and informal (North, 1991). Formal rules consist of political structures and written regulations, while informal rules are norms of behaviour that are difficult to identify. According to Scott (2008), institutions "comprise regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" (p. 56). In the context of public policy, New Institutionalism theories explain how institutions are constructed and

transformed in governance. They help to understand the economic, political, and social context that shape these processes.

New Institutionalism comprises four established strands of theories (Cairney, 2012). Rational Choice Institutionalism regards individuals' preference and rationality; Sociological Institutionalism focuses on the normative frameworks, rules of appropriateness, and cultures that affect social behaviour; and Historical Institutionalism emphasises historical contingency and path-dependency in institutions. Finally, Discursive Institutionalism concerns ideas and the interactive process of discourse in the institutional context.

First, Rational Choice Institutionalism (RCI) takes a calculus approach and aims to "establish what proportion of political outcomes one can explain with reference to the choices of individuals pursuing their preferences under particular conditions" (Cairney, 2012, p.84). Institutions provide enforcement or penalties (Hall & Taylor, 1996) and Rational Choice Institutionalists adopt a functional view of institutions. In this view, institutions are suggested as solutions to collective action problems and can reduce transaction costs (Ostrom, 2007). Actors strategise to maximise utility when institutions emerge or change.

Sociological Institutionalism (SI) evolved from the organisational theory, and it argues that institutions do not develop solely based on rationality but are also influenced by cultures. It deals with "rules of appropriateness", the norms and values within organisations that affect behaviour (March & Olsen, 1989). Thus, Sociological Institutionalists study the "culture" of an organisational field and analyse how organisations converge through shared rules and practices rather than individual preferences (DiMaggio & Powell, 1983). Institutions are shared scripts, and they are constrained by what people conceive as cultural norms. Actors are embedded in institutions that consist of routines and symbols that are interpreted by actors (Hall & Taylor, 1996).

Historical Institutionalism (HI) sees institutions as historically contingent, so the decisions made in the past contribute to the formation and change of institutions in the current practice. The path also solidifies over time through increasing returns or positive feedback effects (Pierson, 2000). Therefore, institutions are stable for a long time. However, there is a "critical juncture" when a certain event or momentum leads to a major change of institutions. The timing of this juncture is important as it sets a new path-dependency of the institution. Historical Institutionalists often compare different nations because a different set of initial conditions and structures will have cumulative effect and set the institutional development on a different path.

Discursive Institutionalism (DI) gives insights into the role of ideas and discourse in institutions, providing a more dynamic approach to institutional change compared to other New Institutionalisms (Schmidt, 2008). Ideas are institutionalised when they become accepted or taken for granted in the policy realms. Ideas are not rigid as structures, but they constantly change as they are defined and re-defined by actors when they communicate. So Discursive Institutionalists analyse how ideas are contested and replaced and help to explain changes in institutions.

Although institutions seem to embrace stability, they go through a continuous change as agents take actions to maintain and transform them. Scholars of New Institutionalism have studied the evolution, reproduction, and change of institutions, yet there is much to be explored about how and why institutions change (Gorges, 2001). The change can be due to either endogenous or exogenous factors (Cairney, 2012) resulting in divergent paces and degrees of change. However, it usually involves the role of knowledge and power in the institutional process driving the change (Phillips et al., 2004). According to Scott (2008), there are various carriers that make the institutional change, which can be embodied as symbolic systems, relational systems, activities, and artifacts, altering and modifying the nature of the message (pp.95-96). He also emphasised the role of "institutional entrepreneurship" in change: the actors that leverage resources to create or transform institutions (p.116).

Institutional change is described as "institutional work", the interplay between actors and institutional structures (Beunen & Patterson, 2016). Institutional work refers to the actions in which actors create, maintain, and disrupt institutional structures. Institutional change leads to policy change, while one can argue that agenda setting (or policy change) does not necessarily result in institutional change. However, agenda setting can open up a new possibility for actions in institutional structure over time, and the combination is referred to as institutional work. Institutional work consists of linked multiple activities and a combination of actions of what policy entrepreneurs or actors pursue (Beunen & Patterson, 2016).

In short, institutions involve elements of both continuity and change, and it is important to explain how and why it matters. The political reality is vast and complicated, and using different New Institutionalisms can enrich our understanding of different forms of reality. The evolution of climate policy and carbon markets is a complex issue that needs to unpack both stability and change.

To understand how and why institutions change in the Paris-era, I used HI to explain stability while combining it with DI to demonstrate change. HI can encompass different aspects of New Institutionalisms in empirical findings and is broad and eclectic in embracing both calculus and cultural approaches (Hall & Taylor, 1996). Although HI can describe the complexity of reality, it may be less effective at explaining policy change: It does not identify the political dissensus of actors within the path-dependent time and lacks an understanding of institutional changes through endogenous factors (Schmidt, 2011). Hall and Talyor (1996) have argued that HI's eclecticism has a cost: It lacks a precise and sophisticated understanding of institutions' emergence and change, therefore needs more interchange among other schools of thought.

In the thesis, I used DI to complement the HI explanation for institutional change. DI was developed to complement other New Institutionalisms. Other New Institutionalisms draw on the background information or institutional "structures", while DI explains the endogenous change through "agency" that can result in either evolutionary or revolutionary change (Schmidt, 2011). HI and DI adopt different perspectives on how institutions change. For instance, HI sees institutions change due to external factors that determines actors' choices and actions. On the contrary, DI sees actors who are sentient to make their own decisions and actively change institutions. However, they share the notion that ideas and power play roles in changing institutions (Thelen, 1999; Schmidt, 2011).

Streeck and Thelen (2005) theorised the types of gradual but transformative changes based on HI: First, *displacement* occurs as established arrangements are discredited, and new institutions gain salience. Secondly, *layering* concerns institutional reforms that involve addition or revisions and can result in differential growth. Thirdly *drift* happens when stable institutions fail to sustain and erode. Forth, *conversion* refers to change due to redirected purpose or functions adapting to serve a new goal. Finally, *exhaustion* involves gradual institutional breakdown.

There are DI scholars who have engaged with the HI tradition to infuse structure and agency in institutions, explaining change and continuity at critical moments or incrementally over time (Schmidt, 2011). For example, Palier (2005) demonstrated an incremental but transformative institutional change in French social policy through layering.

> *…sentient agents infuse HI rules with contextualized meanings, construct understandings and responses to critical moments, or come up with the*

> *ideas that lead to the 'layering' of one institution over another, the 'reinterpretation' of an institution, or the 'conversion' of agents to another institution. (Schmidt, 2011, p.12)*

Institutions are constrained by structure and historical path, but active actors also construct meanings, so the institutions evolve. They have "background ideational abilities" and "foreground discursive abilities" (Schmidt 2008; 2011). Actors, as sentient beings, critically engage with ideas and think, speak, and act collectively to reconstruct the structures (Schmidt, 2011).

In this vein, the thesis combined DI and HI as background theories to understand the complex evolution of climate policy and carbon markets that involves both stability and change. In addition, I adopted the concept of institutional complementarity to understand how the jurisdictional carbon markets diverged due to the established institutional structures. The concept shares the HI thoughts as it analyses how a national policy adapts to the institutional structure and historical path with adaptation (David, 1994; Vergne & Durand, 2010).

HI Scholars have explained the concept of "institutional complementarity" as institutions being affected by incumbent structures, and they develop complementary to established political economy (Hall and Soskice, 2001; Hall and Gingerich, 2009). Institutions are complementarily when "two institutions can be said to be complementary if the presence (or efficiency) of one increases the returns from the other" (Hall & Soskice, 2001, p. 17). Hall and Soskice (2001) suggested that "nations with a particular type of coordination in one sphere of the economy should tend to develop complementary practices in other spheres as well" (p.17). Therefore, I focused on how the K-ETS diverged from the EU ETS due to different institutions established in the past.

To summarise, I first used DI to describe the institutional change of climate policy and carbon markets (3.2.2); then used the concept of institutional complementarity to explain how the carbon markets developed adaptively to the established institutions at jurisdictional levels (3.2.3); and finally adopted HI to discover how a country's climate policy agenda setting is bounded by the institutional structure and path-dependency (3.2.4).

3.2.2. Institutional Change of Climate Policy and Carbon Markets: Discursive Institutionalism

Focusing on the role of agents in driving institutional change, Discursive Institutionalism is used to discover how climate policy and carbon markets are institutionalised through actors' discourse within the governance system (Objective 1). Social constructivists see that various actors are likely to hold different perceptions of what the problem and solution really are in the environmental field. The ideas or discourses are constantly in flux, changing and being redefined as actors communicate and become institutionalised. In particular, Phillips, Lawrence and Hardy (2004) demonstrated that language is fundamental to institutionalisation, as the institutions are constituted through discourse that influence actions. Maguire and Hardy (2006) also found that language has an important role to play in institutional change, and institutional entrepreneurs should be cognisant and sensitive to the discursive context which they operate. The agents are dynamic agents who constantly think, say, and act in complexity driving the construction and change of institutions (Schmidt, 2010). In essence, discourse is an "ensemble of ideas, conceptions, and categorisations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities" (Hajer, 1995 p.44).

There is a strong relationship between power and ideas, and discourse can be a means to exercise and manipulate ideational power (Foucault, 2000). Foucault insisted that discourse has various effects according to who is speaking, the position of power, and the institutional context where it is situated that enables and constrains action (Hajer, 1995). Institutionalisation processes are also often connected to actors with strategies and resources who work politically in pursuit of interests (Phillips et al., 2004). Building on Foucault's work that the social world and relations of power are determined by discourse, Phillips and Hardy (2002) argued that discourse gives meaning to actions enabling organisations and institutions to emerge and change. The change and permanence depend on active discursive reproduction or transformation while actors are entangled in webs of meaning (Hajer, 1995).

According to Carstensen and Schmidt (2016), "ideational power" is the capacity of actors to influence actors' normative and cognitive beliefs through the use of ideational elements of discourse. The power is demonstrated through discourse that contributes to the success or failure of ideas. There are three types of ideational power: *power through ideas* to persuade others cognitive and normative ideas; *power over ideas* as the capacity to control

and dominate meanings of ideas to resist alternative ideas; and *power in ideas* when certain ideas enjoy authority in structuring thoughts at the expense of other ideas, and it is related to established institutional structures (Carstensen & Schmidt, 2016).

Ideas exist at three levels of policy, political and philosophical levels (Schmidt, 2008). Through ideational powers, policy actors attempt changes through "coordinative" discourse to generate ideas or contest and engage in "communicative" discourse to translate and deliberate ideas to the public (Schmidt, 2008; 2011). Usually coordinative discourse is communicated top-down while communicative discourse is bottom-up.

Arts, Leroy and van Tatenhove (2006) argued that change of environmental policy can be understood as the duality of interaction (agency) and social and political change (structure). This is in line with the duality of structure explained by Giddens (1984) portraying a divide between the institutional structure that gives motives and reasons, and agents who has intentions or strategies to find opportunities to change them. Gidden's structuration theory (1984) conceptualise organisation as social systems, with agents nested in the structure of rules and resources. There is also a duality of substance and organisation (Hajer, 1995), which is addressed in social constructivism and New Institutionalism (Leroy & Arts, 2006).

Hajer (1995) has summarised the relationship between actors, discourse, power, and the rules of the game as follows:

> *The politics of **discourse** is not about expressing **power-resources** in language but is about the actual creation of structures and fields of action by means of story-lines, positioning, and the selective employment of comprehensive discursive systems…In this process **actors** are by no means completely autonomous: they are constrained not only by conventional understandings and agreed-upon **rules of the game** but also by mutual positioning, existing institutionalised routines, and changing contexts. (Hajer, 1995 pp. 275-276)*

Some studies have analysed the evolution of green economy and green growth discourse in the climate policy arena after the financial crisis in 2008 to come up with implications for institutional transformation (Borel-Saladin & Turok, 2013; Ferguson, 2015). However, they did not give prospects on how the discourse in the climate policy and carbon markets have developed to institutionalise in the Paris-era. Bäckstrand and Lövbrand (2019) and Stevenson (2019) did analyse broader discourses underpinning the climate governance and

green political economy in recent decades, however, they did not scope into the specific policy discourses of climate policy and carbon markets as cases after the Paris Agreement. These studies also do not shed light on the process of institutionalisation through change in actors and their ideational powers.

Therefore, to answer the first Research Questions (RQ1) "**How did institutions change in the global climate policy arena from the Kyoto to the Paris period? How is the institutional change reflected in global carbon markets and their linking?"**, Chapter 4 delves into the dynamic change in climate policy and carbon markets that leads to institutionalisation from the perspective of actors and discourse coalitions (Liefferink, 2006) in relation to ideational power and the rules of the game, the institutions.

3.2.3. Divergent Institutionalisation of the K-ETS from the EU ETS: Institutional Complementarity

Focus on the policy styles allows for comparing the effects of institutions in different societies (Cairney, 2012). Different nations develop different policy styles, and they diverge in the governments' approach to problem solving and their relationship with policy actors (Howlett, 1991). Comparison of formal institutions such as political systems is present (Lijphart, 1999), however, there is less attention given to comparing institutions, including informal rules that can contribute to divergence in the climate policy styles of multiple nations. Howlett (2003) did explain that policy styles can diverge according to different cultures, as institutions affect what states do, and the patterns and routines have roots from historical development that constrain future choices. Hence, administrative styles differ by institutional arrangements such as the legislative-executive relationship, state participation in the economy, and the level of trust in the state-society interaction.

At the national level, institutions work in complementarity to each other as they are interrelated, so the institutions can produce very different outcomes depending on the existing national institutional contexts and arrangements (Amable, 2000; Aoki, 1994). Institutional complementarity is described as the configuration in which the viability of an institutional form is conditioned by the existence of several other institutional forms, where the conjunction offers greater resilience and performance (Boyer, 2005). Complementarity is the force that sticks institutional forms with another, and results in incremental institutional adaptation (David, 1994). For instance, historical contingency is important in shaping institutional evolution. The evolution process causes lock-in, which results in "path-dependency" due to self-reinforcement (Vergne & Durand, 2010). The

success of the complementarity between two institutions is context dependent, and they have to be compatible with the established social and economic ordering (Boyer, 2005). Institutions are compatible if their coexistence does not result in institutional change but is at a stable equilibrium (Crouch et al., 2005).

Institutional complementarity scholarship has discovered how market institutions have adapted and evolved differently in different nations due to established institutional arrangements (Aoki, 1994). The concept was extended by HI scholars to demonstrate how complementarities are embedded in institutions across different spheres of political economy (Hall and Soskice, 2001; Hall and Gingerich, 2009). However, the conceptual framework has not been applied to analyse national climate policy yet. Watkiss et al. (2015) have studied the complementarity between climate mitigation and adaptation policies globally. Meckling & Allan (2020) did analyse how the economic idea of strong complementarity between environmental protection and economic growth has broadened climate policies from market-based instruments to green innovation and industrial innovation policies. However, these studies do not explain the institutional complementarity of carbon market implementation at national levels. Specifically, there is little information on how Asian countries develop their own policy styles and patterns of environmental governance through adaptation, where the region demonstrates governmental diversity in institutional structures and practices (Mukherjee & Howlett, 2016).

Chapter 5 addressed the gap and answered the second Research Questions of the thesis (RQ2): "**How did the EU ETS and K-ETS institutions evolve differently, and what are the reasons for the divergence? What does that imply to achieving the Paris goals?"** The chapter discovered how ETS is adapting and evolving differently in two different geographies of the EU and South Korea. They have built different institutions over history, and the focus is to describe the different characters of ETS systems while demonstrating how they evolved adaptively to the distinct institutional architectures. It also evaluated to what extent they are institutionalised to deal with the Paris goals.

3.2.4. Contested 2050 Carbon Neutrality Setting of South Korea: Historical Institutionalism

Historical Institutionalism (HI) defines institutions as "formal or informal procedures, routines, norms and conventions embedded in the organisational structure of the polity or political economy" (Hall & Taylor, 1996). HI conceptualize the relationship between

institutions and actors' behaviour in broad terms, and shares the view that institutions are historically contingent, and they develop path-dependently. It sees institutions emerge from and are embedded in concrete temporal processes through historical conflicts and constellations (Hall, 2009). It also emphasises that institutions emerge and sustain due to broader political and social contexts (Thelen, 1999).

Path-dependence involves both continuity and change of institutions (Thelen, 1999). Path-dependence is grounded in the dynamics of "increasing returns" where institutional development is punctuated by a critical moment with self-reinforcement or a positive feedback process (Pierson, 2000). Actors adapt and strategise to reinforce and sustain established institutions (Thelen, 1999). Mahoney and Thelen (2009) explained the slow incremental change of institutions and emphasised that gradual change can result in significance, and actors' power dynamics contribute to the change. Actors challenge policy legacies and pursue incremental change, and the positive feedback process involves power distributions (Béland, 2010).

Munck af Rosenschöld, Rozema and Frye-Levine (2014) reviewed that there are five main mechanisms that generate institutional inertia in climate change action resisting change: costs, uncertainty, path-dependence, power, and legitimacy. There is the cost of free-ridership and transaction cost, while lacking clear definitions or common language that constitutes obstacles to institutional change. Path-dependency and power struggles also contribute to the slow change in climate actions and their legitimacy.

Focusing on institutional change, the thesis examined the critical juncture of the Paris period. The critical juncture is defined as "moments when substantial institutional change takes place thereby creating a branching point from which historical development moves into a new path" (Hall & Taylor, 1996, p.942). New paths disrupt or overwhelm the existing path through accumulated small contingent events resulting in incremental change (Pierson, 2000). Lockwood et al. (2017) have suggested that HI can offer insights on the political angles of the energy transition and be used as an analytical tool for institutional dynamics in sustainable transition. However, the theoretical framework has not been used to scope the evolution of climate policy under the Paris regime and lacks focus on the national level of climate action evolution. Based on Historical Institutionalist thoughts, Dubash (2021) did examine how the national climate governance develops path-dependently due to the intertwined factors of national political institutions, international

politics, and bureaucratic cultures and has suggested the research agenda on climate institutions at national levels, which would diverge globally under the Paris regime.

In this light, Chapter 6 examined the agenda setting process of a transitioning country: South Korean 2050 carbon neutrality target and strategy. It strove to answer the third Research Questions (RQ3): "**How did South Korea set the 2050 carbon neutrality target? What is the role of carbon markets in the strategy? To what extent is the carbon neutrality agenda likely to institutionalise to transform Korea into a low-carbon society?"** It demonstrated how the national 2050 net zero agenda was set through the domestic politics and bureaucratic culture and highlighted how the actors and the institutional structure interacted to attempt the change. Based on the concept of path-dependency, it further evaluated to what extent the nation is likely to transform into a low-carbon society.

3.3. Methods

3.3.1. Qualitative Inquiry

A qualitative research design starts from the philosophical assumption that reality is subjective and multiple. It enables the researcher to collaborate with participants to gain insight into an inquiry (Creswell, 2007). In line with constructivist views, the thesis interpreted how the climate policy and carbon market fields are constructed socially to shed light on prospects in the Paris period. There are multiple interests and power mingled in the reality of climate policy and carbon markets, so complex and subjective meanings are negotiated socially. The focus was to capture the interaction process of multiple actors in the policy with open-ended questioning while considering different institutional settings of cases. Qualitative research can be useful when there is complexity in an issue with multiple meanings, trying to understand the context or settings where the participants are embedded (Creswell, 2007).

The thesis embeds three cases: (1) the institutional change of global climate policy and carbon markets in the Paris-era; (2) divergent institutionalisation of the EU ETS and the K-ETS; and (3) South Korean 2050 carbon neutrality setting. The case study approach is an empirical inquiry that "investigates a contemporary phenomenon in depth and within its real-life context" (Yin, 2009, p.18). The case study is useful when trying to understand the contextual conditions, and to answer details of how and why. Based on the New Institutionalist views, different analytical frameworks were applied to each case (see Section 3.2). Grounded in social constructivism, descriptions of the cases were drawn through thematic analysis. Written and verbal forms of data from multiple stakeholders in

the global climate policy, the carbon markets including the EU ETS and the K-ETS, and Korean climate policy were collected for analysis. Overall, the data were either written and spoken in English or Korean, and I used my bi-lingual ability to gather and interpret the data.

3.3.2. Data Collection

The thesis examined and captured the institutional change from the Kyoto to the Paris-era by focusing on actors and their discourses in the cases of global climate policy and carbon markets, the case of the EU ETS and the K-ETS, and the South Korean 2050 carbon neutrality target setting. Public policy is made of language (Hajer, 2002). The written and verbal communications of multiple policy actors such as the government, research, industry, lobby groups, civil society, and media sectors can explain how policy and markets construct and evolve within their institutional contexts. Yin (2009) suggested using multiple sources, a chain of evidence, and a review from key informants to construct the validity of the case study. The case study data were collected extensively, drawing on multiple sources of information, such as observations, interviews, documents, and audio-visual materials (Cresswell, 2007).

Information on climate policy and carbon markets evolution was collected from policy documents, multiple stakeholder interviews, and observation of agenda setting events through audio-visual materials. Both formal and informal norms were sought, and different sources of materials functioned to mutually triangulate the information. The documents were reviewed first, and the interviews were used to generate complementary evidence about the informal routines and norms, details of the processes, and reasons for decisions and actions. The data were further reviewed for accuracy and reliability after the compilation of the whole data set.

Documents Analysis

Publicly available documents were investigated, including legal and policy documents, meeting minutes, speeches, governmental reports, academic and grey literature, forum and consultation documents, and media outputs, and website information. Documents were used to explore the topic and identify key agents and activities, to infer questions before interviews (Yin, 2009). The documents were searched using keywords related to the core research topic, and they were sought to cover various views of multiple stakeholders from different sectors including the government, research, industry, Non-Profit Organisations (NPOs), Non-Government Organisations (NGOs) and civil societies and

media. Document analysis has its strength as it can be reviewed repeatedly with broad coverage, and they contain the exact details of an event (Yin, 2009). The exact amount of policy documents could not be counted, as the website information is included, while the volume of documents varied widely. Some academic literature that was reviewed in Chapter 2 was also analysed as case materials. In all, approximately over 200 policy documents were collected and used for analysis.

Publicly available documents for global climate policy and carbon markets including EU ETS constitute a range of legal documents such as UNFCCC submissions and decisions, EU ETS documents like Green Paper, EU Directives and Decisions, consultation papers and meeting notes of the UNFCCC negotiations and the EU Commission. Governments and parliamentary reports of the EU member states, reports and position letters from climate policy NGOs, private sector Non-Profit Organisations (NPOs) were included. Academic literature, working papers and other grey literature, media contents were also collected for analysis. Documents written in English were sought.

To review the Korean climate policy including the K-ETS and Korean 2050 Carbon Neutrality agenda setting, documents were searched from official websites, and they included Korean legal documents, government and national assembly reports, seminar reports, and position letters relating to the K-ETS and Korean climate policy. For example, the documents included the K-ETS law and the presidential decree, guidelines, the national plans like the K-ETS basic plan and allocation plans. For a review of climate policy in South Korea, diverse documents were analysed including the national energy laws and guidelines, national plans for energy supply, and materials related to the Korean Green New Deal plan, Long-term low greenhouse gas Emission Development Strategies (LEDS), and the 2050 Carbon Neutrality Strategy. Grey literature of think-tanks and NGOs and academic literature were also analysed. Most legal documents were written in the Korean language, although some English documents were available which were research papers written in English or were translated for international readers, or prepared to submit as part of the climate negotiation processes.

Stakeholders Interviews

Institutions involve both formal and informal rules, and informal rules are difficult to define, identify, and study as they are not written (Cairney, 2012). To investigate the informal rules and norms that constitute institutions, multiple policy actor interviews are conducted. Semi-structured interviews were used to generate complementary evidence

about the details of the processes and reasons for decisions and actions that cannot be evidenced using documentary material alone. Interview questions were designed to focus discussion on how the policy arena is institutionalising and perceptions of why the institutions are changing or not changing (see Appendix B-Interview Guide). The interviews were guided by semi-structured and open-ended questions. Face-to-face interviews or video conference interviews were used depending on the availability of participants and limitations in time and space arrangements including COVID-19 social distancing measures.

The interview questions and procedures were refined after two pilot interviews in Leeds, UK in October 2019 according to convenience, access, and geographic proximity (Yin, 2009). After two pilot interviews, I attended an annual international carbon market conference held in London in October 2019, and recruited six speakers of the conference for face-to-face interviews. The interviews were scheduled according to participants' availability and convenience, and some were interviewed through video conference calls upon request. The conference was a good venue to recruit participants as the speakers were invited from multiple sectors, and their expertise and influence were guaranteed. The interviews for global climate policy and carbon markets and the EU ETS were mainly held in Brussels and London as the cities are considered centres of pioneering climate policy and carbon markets, where many professionals in the field are based. In all, 20 interviews were conducted with 21 experts in Europe between October 2019-March 2020.

Among 21 participants, 13 participants were recruited based on knowledge from my previous career (1), document analysis (5), and referral sampling (7) to cover all sectors. For example, I looked up the organisation names that were most frequently found in the policy documents, then searched for names and contacts of the senior staff through the internet. The participants were recruited via email invitations, and referral sampling was also used to identify and recruit further participants. I asked the participants to recommend other potential interviewees by asking "Is there anyone else who you think that I should talk to?" at the end of each interview.

Another 20 interviews were conducted in South Korea between August 2020 and June 2021. The recruitment of South Korean climate policy and K-ETS policy actors was mainly based on experience and network built during my previous career as a researcher at the Greenhouse Gas Inventory and Research Centre under the Ministry of Environment of Korea. Two of the participants were previous co-workers, and the other 13 participants were contacts I've known from my previous career. I've either met or heard of them

because they were representative in the field, and the document analysis has confirmed their visibility and influence on Korean climate policy. The rest of the five participants were referred experts from other participants. In all, eight face-to-face interviews were held in Seoul, the capital city of the nation, and 23 were conducted via video conference calls. Most South Korean interviews were done in the Korean language except two that were conducted in English.

The interviews typically ranged from 30 to 60 minutes in length. To capture the institutional change of climate policy and carbon markets, the participants were asked about: (1) who the active actors and their discourses were; (2) where the power comes from and how it is demonstrated; and (3) how power changed the rules of the game and why. Then the interviews included questions about how ETS rules and institutions have changed in both study sites and discussed the perception of the ETSs and their legitimation to policy actors (See Appendix B-Interview Guide).

In particular, the interviews in South Korea included discussions about the controversial 2050 carbon neutrality target and strategy setting as many participants elaborated and were willing to discuss the topic. The interviews were reflexive as I viewed climate policy and carbon markets as socially constructed, where the policy actors constantly think, say and act driving the construction and change of institutions (Schmidt, 2011). The interviews were open and “collaborative”, so the questions were adapted to enable the participant to elaborate as much detail as they were willing (Rapley, 2004). The interviews are interactional events where the researcher and the interviewee mutually monitor each other’s talk, and it was considered as a process of making meaning or producing knowledge (Rapley, 2004). Thus, the constructivist approach was also relevant in data collection.

All 40 interviews were audio-recorded under the participants’ permission before the interviews, and they were transcribed afterward for analysis. I also translated 18 interviews that were conducted in the Korean language to have the whole set of data in the English language.

To summarise, 20 face-to-face interviews were held in Leeds (2), Brussels (4), London (6), and Seoul (8). Another 20 interviews were done over video conference calls. They included experts from the government sector (9), academia (7), industry or consultancies (9), Non-Governmental Organisations (NGOs) and civil society (7), Non-Profit Organisations (NPOs) and think-tanks (6) and media (3). The interviewees included senior-level experts in the field.

Sectors	**Europe**	**South Korea**
Government	3	6
Academia	5	2
NGOs/Civil Society	3	4
Non-Profit Organisations/ Think-tanks	4	2
Industry/Consulting	4	5
Media	2	1
Total	21*	20

Table 3.1. Number of policy stakeholders interviewed (*total number of participants was 21 because one interview was held with two participants at once at their requests)

Observation of the Policy Events

After exploring the theme of "South Korean 2050 Carbon Neutrality Setting" during the policy actor interviews in South Korea, I observed two key policy events. They were the public consultation events for the 2050 carbon neutrality target and strategy setting that were held before solidifying the LEDS to be submitted to the UNFCCC at the end of 2020. Observing these events was useful to gather opinions and perceptions of policy actors from various sectors to complement document analysis and interviews.

The events were open to the public through the YouTube channel of the Ministry of Environment of Korea, and recordings were uploaded to the channel. The first event was the "Challenges and Tasks of Establishing the 2050 LEDS for Transition towards Carbon Neutrality" public discussion meeting held on 17 October 2020[2]. It was organised by 15 government ministries, with the lead being the Ministry of Environment. The second event was the "Public Consultation Seminar on 2050 LEDS", which was held on 19 November 2020[3] and was organised by the Climate Change Forum of the Korean National Assembly and the Ministry of Environment of Korea. After observing the events, the speeches of various experts and stakeholders were transcribed and translated into English for analysis.

[2] https://www.youtube.com/watch?v=HN1sUU543lU

[3] https://www.youtube.com/watch?v=iR0S7IyG0uM

3.3.3. Data Analysis

Thematic Analysis

Public policy is made up of language (Hajer, 2002). To understand how agency and structure interact to produce or change institutions, the written and spoken forms of language from multiple policy actors in the climate policy and carbon markets arena were collected and analysed. The data were in various formats of documents, interviews, and audio-visual recordings of public events for agenda setting.

Thematic analysis was used to analyse the qualitative data. Thematic analysis entails identifying, analysing, organising, describing, and reporting themes across a data set (Braun & Clarke, 2006). The theme is defined as "actively constructed patterns (or meanings) derived from a data set that answers a research question" (Kiger & Varpio, 2020). Joffe (2011) asserted that thematic analysis is suitable for constructivism as it can illustrate social construction by describing and interpreting codes and themes. As the researcher of the project, I became the instrument for analysis and made judgements about coding, constructing themes, and contextualising the data (Starks & Trinidad, 2007).

In the case studies, the themes were identified both inductively and deductively. It was deductive since the data collection was conducted based on the research questions as the guide. At the same time, it was also an inductive process as some themes emerged at a later stage of data collection and analysis. Hence, the process of data collection and analysis are not always distinct steps in the qualitative study; they are often interrelated and occur simultaneously (Creswell, 2007).

All interview and observation transcripts were collated and printed out for analysis. Reading through the scripts, I found several groups of thoughts that had similar or contrasting meanings and highlighted them with different colour markers. These groupings of thoughts have become the core themes of the thesis: (1) change in actors, discourse, and powers in the Paris-era; (2) different design and characteristics of the EU ETS and the K-ETS; (3) South Korea 2050 net-zero agenda setting.

The quotes were categorised and grouped according to the themes. Coded quotes were blocks of the same ideas, ranging from one sentence to several sentences. The data were re-organised by themes in MS Word. Then the data were again categorised into sub-categories to streamline what stories stand out from the broad theme. I tried to find and solicit the main story from each theme. They were reported in MS word again with the quotes that best describe the main storyline.

For example, to explore how the climate policy and carbon markets institutions changed (RQ 1), the data were first grouped into sub-categories of actors, discourses, power, and rules of the game in the Kyoto and Paris period. Then the change between the two periods was mapped focusing on their intertwined relationships. Through the coding, two clusters of ideas were identified: actors and ideas around “maintaining economic competitiveness” and “climate emergency”. Starting from the angles of actors and their discourse, a main storyline was created in relation to the ideational power and change of the rules of the game.

In order to compare and answer how and why the K-ETS institutions diverged from the EU ETS (RQ 2), the different characteristics and their reasons were coded. The key variables for differences were identified as sub-categories: the political structures and energy sector management institutions. Then the design elements of ETS in post-2020 (EU ETS phase 4 and K-ETS phase 3) were categorised again to compare how they differentiated due to the established structures and institutions. The implications for the Paris regime were drawn after the comparison.

Finally, to discover how South Korea set the 2050 carbon neutrality target and strategy and identify the role of carbon markets in the strategy (RQ 3), the data were categorised by different actors and their views to highlight the contested nature of the agenda setting process. Then they were re-organised in temporal orders of the political process. The analysis focused on the path-dependent and historically contingent characteristics of institutions to evaluate to what extent the climate policy was institutionalised, leading to transformation to a low-carbon society.

The documents were used to serve as background knowledge, and they were used to complement and strengthen the evidence after analysing the interviews and observation transcripts. In all, documents were used initially to sketch the broader scenes of the topic, identify study participants, and draft the interview questions. After the interviews and observation, it was used to verify and complement the data.

Rigour and Trustworthiness

Thematic analysis has the advantage of its flexibility when dealing with rich, detailed, and complex qualitative data. However, due to the flexible prescription and procedures, it can also be questioned for its rigour and trustworthiness (Nowell et al., 2017). To assure the rigour and trustworthiness of the analysis, I disclosed the method for data collection and analysis in detail in this Chapter. Nowell et al. (2017) argued that thematic analysis should

be precise, consistent, and exhaustive through recording, systemisation and disclosing the method with details so that the reader can determine the process to be credible.

According to Guba and Lincoln (1989), credibility, transferability, dependability, and confirmability are the criteria for rigour and trustworthiness in a qualitative study. Firstly, I tried to make the analysis **credible** through triangulation of data between multiple sources of materials like documents, interviews, and observations. In analysis, I kept contact and had regular meetings with supervisors for debriefing the research process and received feedback on each step. I also leveraged to get reviews from postgraduate research colleagues about the findings and reporting of data whenever possible. Secondly, the case studies embedded in the thesis might not be **transferable** to be generalised as it deals with three distinct cases of global climate policy and carbon markets, the EU ETS and the K-ETS, and South Korea 2050 carbon neutrality setting. However, I tried to keep the detailed description of the methodology for each case, so it could be reproduced for other cases in the future. For instance, other ETSs can be analysed with the analytical framework and methods based on theories, as well as the case of 2050 net-zero agenda setting of other countries. Thirdly, to ensure **dependability,** I tried to save and documented all the raw data and series of notes and reporting of analyses. I took notes and kept journals during data collection and analysis so that the process can be traced from the original data. For example, the initial analysis involved coding by highlighting clusters of similar ideas and themes with colours on the transcript. I also drew groupings of themes and ideas in a notebook to find the relationship between them. The raw data of documents, audio recordings, field notes during interviews, transcription and translation, and records of activities for coding were all stored to be traced when needed in the future. Finally, for **confirmability**, I tried to consistently review whether the research process is reaching credibility, transferability, dependability, and strived to rationalise any decision made during the research.

3.4. Research Ethics, Practicalities and Limitations

3.4.1. Research Ethics

As human subjects were being studied, they must be protected ethically during data collection. The process ensured that the participants' "dignity, rights and welfare"[4] were protected. The thesis and its methodology went through the ethics and ethical review

[4] According to the Research Ethics of Economic and Social Research Council [https://esrc.ukri.org/funding/guidance-for-applicants/research-ethics/]

process approved by the ethical review committee of Social Sciences/Environment/LUBS (AREA) at the University of Leeds before data collection commenced on July 22, 2019 (Reference AREA 18-181). Before the interviews, the participants were fully informed about the purpose, methods, and possible uses of research, and informed consent was obtained from each participant both in written and verbal forms (Appendix A – Information Sheet and the Consent Form). At the beginning of an interview, the PhD project was introduced in detail again, with a recap of the ethical consent. The interviewees participated voluntarily, and the participants' privacy and confidentiality were ensured and preserved throughout. I also made sure that the interview could be paused or cancelled if any physical or mental distress arose during the interview. All the interviewees' names and contents were anonymised for analysis and presentation, and the interview data were confidential and secured while the research team consisting of myself, and supervisors only had access to the data.

3.4.2. Practicalities and Limitations

The data collection involved web-based documents which can be subjective and limited in terms of information preservation. To minimise the limitations, I searched for information on the official websites that were clear in their sources and postings, such as the UNFCCC, government web pages, and large and representative organisations in each sector. I collected web materials that were established and regularly updated for a long time and had potential to persist in the future.

During the policy actor interviews, I found that the participants' sectors were not always clear cut. Some interviewees had different roles in different sectors, such as think-tank and academia, and some changed sectors during their careers, for instance, from the government to consulting. Therefore, I focused on the interviewee's most recent main role as the sector category in the analysis. Multiple roles and sector changes were more apparent in European participants, while South Korean interviewees had a single role, and it was rare for them to change their jobs during their careers.

The recruitment of Korean interviewees largely depended on my acquaintance and networks built during my previous career in the Ministry of Environment of Korea. This may have caused sampling bias, as I was part of one sector (government) among multiple sectors involved in climate policy and carbon markets. For instance, it was easy to reach out to government sector experts, while it was more difficult to recruit interviewees in the industry, and they were more reluctant to share opinions and disclose information. Thus,

my previous career experience could have influenced the participant recruitment and interview contents in South Korea, although I tried to balance the sectors in recruitment and remain objective in invitations and discussions during interviews.

On the other hand, my previous career and networks facilitated the data collection process. During some interviews, it was helpful to have deeper discussion as there was more trust due to the previous acquaintance. Moreover, it also helped to schedule online interviews through video conference calls which were prioritised due to the COVID-19 Pandemic. Koreans tended to hesitate about online interviews with strangers and perceived them as a less trustful method to communicate. I found Korean culture to be open and responsive to a person with an acquaintance or who has been introduced by an acquaintance.

Overarching Research Question	Research Questions	Cases	Analytical Framework	Materials and Methods	Analysis
How are the climate policy and carbon markets evolving in the Paris period, and to what extent are they institutionalised to transform into a low carbon world?	**RQ1.** -How did institutions change in the global climate policy arena from the Kyoto to the Paris period? -How is the institutional change reflected in the global carbon markets and their linking?	Institutional change of global climate policy and the carbon markets	Discursive Institutionalism	-Document Analysis: global climate policy & governance, UNFCCC negotiations, global carbon markets documents -Semi-structured interviews: global climate policy actors and carbon markets stakeholders (including EU ETS, K-ETS)	Thematic Analysis
	RQ2. -How did K-ETS institutions evolve differently from the EU ETS, and what are the reasons for the divergence? -What does that imply to reaching the Paris goals?	The EU ETS and the K-ETS	Historical Institutionalism+ Institutional Complementarity	-Document analysis: EU ETS and K-ETS policy documents -Semi-structured interviews: EU ETS and K-ETS stakeholders	
	RQ3. -How did South Korea set its 2050 carbon neutrality target? -What is the role of carbon markets in the carbon neutrality strategy? -To what extent is the carbon neutrality agenda likely to institutionalise to transform Korea into a low-carbon society?	South Korean 2050 Carbon Neutrality setting	Historical Institutionalism	-Document analysis: South Korean 2050 carbon neutrality agenda setting documents -Semi-structured interviews: South Korean climate policy actors -Observation: recorded audio-visual meetings on the 2050 carbon neutrality agenda setting	

Table 3.2. Summary of the Research Process

Chapter 4. Institutional Change in Carbon Markets in the Paris-era: From Global Linking to Fragmentation

4.1. Introduction

Carbon markets emerged during the Kyoto period as a diplomatic and political outcome under the leadership of a powerful epistemic network (Calel, 2013). Developed countries intended to include market mechanisms in the Kyoto Protocol as a way to involve developing countries in the climate change actions (Bulkeley and Newell, 2010). They were also seen to improve political acceptability among business actors due to their flexibility and opportunity to create a new market under the neo-liberal regime (Bailey and Maresh, 2009; Bailey, Gouldson and Newell, 2011). In the Kyoto times, a globally linked carbon market was envisioned. However, after the US withdrew from the Kyoto Protocol, and due to the failure to agree on a top-down climate policy, the global carbon market remains fragmented (Gulbrandsen et al., 2019).

The politics and governance of climate policy and carbon markets have been extensively studied (Bulkeley and Newell, 2010; Stephan and Paterson, 2012), as have the social and political processes involve in constructing carbon markets and their limitations (Wara, 2007; Lohmann, 2009; MacKenzie, 2009). While the Kyoto Protocol aimed for a legally binding agreement with international enforcement (Sugiyama, 2001), the Paris architecture is complex, fragmented, and polycentric (Keohane & Victor, 2011; Green et al, 2014; van Asselt & Zelli, 2014). In this study, we examine the dynamic policy change from the Kyoto-era to the Paris-era. The Paris Agreement marks a change in momentum in global climate policy, but the market mechanism is still considered central to the Paris goals. We seek to answer the questions: (1) how did institutions change in the global climate policy arena from the Kyoto to the Paris period? and (2) how is the institutional change reflected in the global carbon markets and their linking? We employed Discursive Institutionalism and used the concept of “ideational power” to analyse institutional dynamics and how policy actors, their discourse, and power have sought to change institutions.

Our findings show that new actors with ideational power around “climate emergency” have emerged in the Paris-era. However, institutional change has remained incremental due to

the collision of this new discourse with the old idea of “maintaining competitiveness” and the power and rules of the Kyoto-era. Due to the failure of policy practice to achieve collective action and protectionism, the focus of the discourse on carbon markets has shifted from global linking to fragmented mini-lateral linking as a compromise. We highlight the gap between the policy discourse and change in institutions in the Paris period. We argue that the “climate emergency” discourse has not yet been able to achieve institutional change in climate policy and carbon markets and highlight the challenge of overcoming the established institutional power.

The next section outlines the pertinent literature and locates our aims to it. The third section explains the materials and method used in our analysis (4.3). Section four analyses the cases of global climate policy and carbon markets (4.4). We conclude by discussing the implications of our findings (4.5).

4.2. Literature Review

Carbon markets involve the trading of greenhouse gas (GHG) emission allowances allocated by governments or offset credits generated under the UNFCCC market mechanisms. They were the flagship policy to mitigate GHG emissions under the Kyoto Protocol. The economic efficiency demonstrated by the US cap-and-trade solutions in 1980s-1990s was used by a policy network of politicians, academics, and sectors who wanted to minimise the cost of emission reduction in the Kyoto times (Calel, 2013; Voß, 2007). An example of a carbon market is the EU ETS, the adoption and design of which has been thoroughly examined (Bailey, 2007b; Bailey and Maresh, 2009; Bailey, Gouldson and Newell, 2011). The literature highlights that it was the interests of powerful players that enabled the adoption of the EU ETS. The EU adopted the ETS as a key measure to meet its Kyoto mitigation targets owing to economic efficiency debates and intended to link the ETS internationally with a “clear ambition to become the hub of a globalising carbon market” (Carbon Trust, 2008, p.25).

Globally linked carbon markets were envisioned when the Kyoto Protocol Article 17 provided for the creation of emissions trading and offset mechanisms such as the Clean Development Mechanism (CDM) and Joint Implementation (JI). However, global carbon markets have also been contested (Wara, 2007; Gilbertson and Reyes, 2009), and their linking has remained marginal as heterogeneous ETSs have emerged due to different local political priorities and divergent institutions (Gulbrandsen et al., 2019). The literature has stressed the importance of linking fragmented policies including ETS in the post-Kyoto

times (Green et al, 2014; Ranson & Stavins, 2012; Van Assault & Zelli, 2014). Much of the literature has focused on modelling optimal design and analysing cost and benefits of linking (Doda, Quemin, and Taschini, 2019; Flachsland, Marschinski, and Edenhofer, 2009).

Currently, there are 25 ETSs in operation globally (ICAP, 2022), and 75 parties intend to use market mechanisms under the Paris Agreement (World Bank, 2021). The market mechanisms provided for in Article 6 of the Paris Agreement are expected to help achieve the Paris goals. Michaelowa (2017) stressed that market mechanisms are even more important in the Paris-era than in the Kyoto times because they enable increasing ambition in the bottom-up pledge and review architecture. However, there is continued contestation of the market mechanism that led to stagnation in rulemaking in the UNFCCC negotiations after the Paris Agreement.

Carbon markets are socially constructed (Knox-Hayes, 2010) and involve power relations and contestation, so the institutions related to carbon markets are continuously shaped and reshaped (Stephan & Paterson, 2012). Some consider the carbon market an experiment where actors are engaged in continuous reflexive activities to create, frame, and operate the market (Lohmann, 2009; MacKenzie, 2009). In this vein, we seek to understand how global climate policy has evolved by focusing on actors, their discourse, and ideational power change. We explore how and why climate policy and carbon markets have evolved by asking: (1) how have institutions changed in the global climate policy arena from the Kyoto period to the Paris period?; and (2) how is the institutional change reflected in the carbon markets and their linking?

Institutions include formal and informal rules that structure political, economic, and social interactions (North, 1991). They are characterised by both continuity and change as they are continuously contested by actors seeking to change them. For example, despite the global warming gridlock (Victor, 2011), the Paris Agreement was reached in 2015 and ratified by 189 parties (UNFCCC, 2021). Beunen & Patterson (2019) suggest that institutions change because of institutional work, a dynamic interplay between institutional structure and actors that create, maintain, and revise institutional structure. However, few studies have examined how actors and the institutional structure interact to change climate governance.

The rise of mini-lateralism and fragmentation in global climate governance have been noted since the Copenhagen conference (Widerberg & Pattberg, 2015; Falkner 2010; Falkner 2016a). Berstein et al. (2010) analysed the rise of bottom-up fragmented carbon

markets and their potential to support cooperations in the Paris-era. Efforts to link bottom-up actions have become more important in the post-Kyoto era (Green et al., 2014). However, these studies do not focus on actors' discourses and their power dynamics that are at work to change the institutions.

To understand the dynamics of change in the global climate policy and carbon markets, we focus on how actors interact to produce a conflict over or compromise for change through discourse. Ideas and discourses are important for institutionalisation and institutional change (Schmidt, 2010). Here, discourse refers to an "ensemble of ideas, conceptions, and categorizations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities" (Hajer, 1995, p.44).

Bäckstrand & Lövbrand (2007; 2019) examined how the discourses of green governmentality, ecological modernisation, and civic environmentalism were reflected in climate change governance from the Kyoto period to the post-Copenhagen period. They suggested that discourse has subtly changed with the rise of climate justice claims and emergence of new actors after the Copenhagen period, but that green governmentality and ecological modernisation have persisted in the global discursive landscape. However, they did not examine how discourses were contested by actors and how actors utilised ideational power to change institutions.

We focus on understanding the process of institutional change in the Paris-era. Some have studied how actors and their discourses have institutionalised climate policies at national levels (Lorenzoni & Benson, 2014; Gillard, 2016). Fitch-Roy et al. (2020) explained how the business-environment discursive coalition enabled the EU ETS reform in 2013, and Den Besten et al. (2014) analysed how REDD+ institutions evolved through actors' discourse in the international climate change negotiations. Others have studied the discursive legitimisation of "gold standard" carbon credits (Blum and Lövbrand, 2019) and of international offsets and voluntary carbon markets under the Paris regime (Blum, 2020). However, we do not understand well how and to what extent actors and their discourses are driving institutional change in the broader global climate policy and carbon markets in the Paris-era.

Discourse institutionalises when “discourse coalitions emerge in policy fields, fight for dominance and push for formal or informal rule making” (Den Besten et al., 2014, p.42). We investigated how actors, and their discourses are affecting change in global climate policy and institutions of carbon markets through their ideational power from the Kyoto to the Paris period.

We also adopted the concept of “ideational power” to explain how ideas play into the process of power and resistance in climate policy (Carstensen & Schmidt, 2016). There is a strong relationship between power and ideas, and discourse can be a means to exercise ideational power (Foucault, 2000). Carstensen and Schmidt (2016) defined ideational power as the capacity of actors to influence actors’ normative and cognitive beliefs through discourse. There are three forms of ideational power that affect policy stability and change (Carstensen & Shmidt, 2016). First is *power through ideas,* which can persuade and induce people through a discourse to change; second is *power over ideas,* which is prominent in resisting the change; and *power in ideas,* which has authority due to hegemony that takes place in the policy arena.

4.3. Materials and Methods

We examined institutional change from the Kyoto to the Paris-era by focusing on actors and their discourses in the cases of global climate policy and carbon markets. The first part explores how global climate policy institutions have evolved in general, while the latter focuses on the institutional change played out in carbon markets and linking. We first analysed over 80 publicly available documents, including a range of legal documents such as UNFCCC submissions and decisions and EU ETS Green Papers, EU Directives and Decisions, and consultation papers and meeting notes of the UNFCCC negotiations and the European Commission. Government and parliamentary reports of EU member states, reports and position letters from climate policy NGOs, private sector Non-Profit Organisations (NPOs), non-academic literature, and media contents were also analysed. We first analysed the documents to identify key actors and their discourses and traced how the rules changed in global climate policy and carbon markets.

We then conducted twenty policy actor interviews between October 2019 and March 2020. The participants were identified during document analysis on the basis of their visibility and influence. After two pilot interviews, one of the authors attended an international carbon market conference in London in October 2019 and recruited six speakers for face-to-face interviews. Referral sampling was used to identify further participants. In all, 10 face-to-

face interviews were conducted in London and Brussels, as centres of global climate policy. Another 10 interviews were conducted over video conference calls. The interviewees included representatives from academia (5), governments (3), Non-Profit Organisations (NPOs) for business, investors, and financial sectors (4), consultants (4), Non-Governmental Organisations (NGOs) (3), and media (2).

The interviews were semi-structured and ranged from 30 to 60 minutes in length. We interviewed policy actors about (i) who the active actors and what the dominant discourses were; (ii) where the power comes from and how it is demonstrated; and (iii) how the power changed the rules of the game and why. The interviews were reflexive as we view the climate policy and carbon markets as socially constructed, where policy actors constantly think, say and act driving the construction and change of institutions (Schmidt, 2011). During the interviews, we ensured that the participants' anonymity and confidentiality was preserved. Institutional ethical clearance was obtained for the research before data collection commenced.

We identified the themes that emerged in the discourse data. We identified two clusters of actors and ideas around "maintaining competitiveness" and "climate emergency" as the two dominant discourses. We analysed to focus on how the powers and institutions changed between two periods according to the change of actors' discourse.

4.4. Results

We first examine the global climate change policy as the background of carbon markets and their linking institutions, and then explore how discourse and power have affected institutions of carbon markets and their linking.

4.4.1. Change in the Global Climate Change Policy

We find that there has been a rise of actors around discourse of climate emergency in the Paris-era, which has led to a collision of ideational powers. However, the rules of the game have only changed incrementally with hybridisation. Here, the rules of the game are the institutions.

Rise of Actors around Climate Emergency Discourse

In the Kyoto-era, the key participants of climate change negotiations were governments and experts, an epistemic community (Haas, 2004) which developed and shared new knowledge for policy decision making. The large and powerful states like the US and the EU drove the Kyoto regime. The range of active actors has since broadened after the US pulled out of the negotiations and the failure of the COP15 in Copenhagen (Bäckstrand &

Lövbrand, 2019). The Kyoto Protocol established the mitigation commitments only to developed countries, while the Paris Agreement involves 189 nations acting through Nationally Determined Contributions (NDCs). Although some developing nations were vocal about the North-South divide and asserted "common but differentiated responsibilities", knowledge of the developing nations and indigenous voices were marginalised in the Kyoto-era (Lahsen, 2007; Smith, 2007).

The UNFCCC negotiations changed to become more complex, as responsibilities and capabilities evolve and developing countries' positions differentiated over time (Brunnée & Streck, 2013; Blaxekjær & Nielsen, 2015). In the Paris-era, developing nations have become more vocal, and they actively partake in action through the pledge and review process. One of the participants who was involved in both COP 24 negotiations and the IPCC Special Report on Global Warming of 1. 5 °C (2018) had noticed the change in actors speaking in the meetings:

> *I think this is change because the first one [COP] I've been to it was always the UK, Germany, Americans, and Saudi Arabia doing all the talking and the Saudi Arabians were just kind of happy with Chinese…those four, five countries. But instead, there was really change, and lots of country that will speak. And it isn't the rich that had authority. Some of them it [climate change] really affects their own countries. So, I have found that change really kind of surprising. (Director, Research)*

Paterson and Stripple (2007) found the territorialisation was present in climate governance during the Kyoto-era, and it was the state elites who were articulate in the negotiations. However, the transnational networks, community-based civil societies, and public-private partnerships have played an increasingly significant role in climate governance over time (Bulkeley & Newell, 2010). There was rise of number and roles of Non-State Actors (NSAs) in the UNFCCC governance after the Copenhagen conference (Bäckstrand et al., 2017; Kuyper et al., 2018). Multiple participants confirmed that the range of actors involved in climate change negotiations has expanded to include diverse NSAs in the Paris-era.

> *I think that coming back from the COP in Madrid (2019), there was a lot of pressure coming from people on the street and coming from civil society movement, which is larger and diverse it ever was as far as I know. It's not an issue anymore for environmental or development NGOs, but there is large alliances, which include indigenous people movements,*

> *which include trade unions. The youth taking the streets, and the Fridays for future and strikes which generates lots of pressure from the outside and strong demands, and the very principle demands. (Policy Director, NGO)*

Although the NSAs are still not involved in the formal negotiations (van Asselt, 2016) and their actions lack democratic legitimacy (Bäckstrand & Kuyper, 2017), their presence and voices have "empowered a lot of countries in their positions and helped put different kinds of pressure on negotiating process as well" (Policy Director, Investors NPO).

In the Kyoto times, the major discourse on climate change was that it is a "global problem", and that "maintaining economic competitiveness" was important. The discourse was centred around green governmentality and ecological modernisation with the win-win narrative of economics and environment (Bäckstrand & Lövbrand, 2007). The Kyoto regime called for a top-down multi-lateral model of a global carbon market as a key mitigation policy measure. However, after the failure of the COP15 in Copenhagen (2009) to achieve legally binding targets for nations, the bottom-up pledge and review strategy has gained more legitimacy (Falkner, 2016b).

After the Paris Agreement, a climate emergency frame rose, to change the perception of climate change (Mchugh et al., 2021). The climate emergency discourse has emerged due to the scientific evidence on climate change and its impacts in the IPCC 5th Assessment Report (2014) and the Special Report on Global Warming of 1.5 °C (2018). These reports highlighted events such as the melting of Arctic and Antarctic Sea ice, heat waves, mass forest fires and inundation of land worldwide. Several participants mentioned that civil society movements such as the Extinction Rebellion and Fridays for Future are associated with the shifts in the climate change discourse:

> *It has changed the whole discourse, you know, this sort of notion of emergency and crisis has now arrived. Before that, it [climate change] was sort of a problem, not a crisis. (Professor 1, Research)*

In short, the acknowledgement of a crisis and the failure of collective action to address the problem of climate change have changed the discourse. The public has become more aware of the scientific knowledge on climate change and the urgency of the matter, facilitated by the communication of diverse NSAs.

According to Schmidt (2008), there are policy, programmatic, and philosophical levels of discourse. Discursive activities have changed the policy and programmatic levels owing to the climate emergency. But the changed discourse also involves deeper level of philosophy or ideology. A participant considered that there is a shift in ideology, and that the old discourse is losing the battle:

> *I think there's been a shift in the public debate. And the people who are rational and talking about this as an economic position are losing the battle to the people that are pure green, green people…So more pragmatic stuff, we're losing terrain and it's becoming an ideological thing. (Executive Director, Business NPO)*

Crash of Ideational Powers

Power refers to the "mobilisation and deployment of the available resources, and influence to who determines policy outcomes and how" (Liefferink, 2006, p.47). Power can be demonstrated directly through decision making or indirectly through agenda setting and preference shaping, and ideational power can have an impact both through top-down and bottom-up processes (Carstensen & Schmidt, 2016). As a result of changes in actors and discourses, power is shifting towards the public, which knows, talks, and acts through its discourse. While in the Kyoto-era power was retained by the states and experts in policy networks (top-down), the changing discourse indicates the rising power of the public (bottom-up). The public, with new awareness or knowledge, demands and puts pressure on decision makers:

> *From Kyoto to Paris, also had a huge increase in public concern, public awareness, corporate concerns, corporate awareness. (Correspondent, Media)*

However, power has not moved entirely to the public although it has shifted in that direction. Decisions are still made by states and policy networks in formal negotiations. There is thus a power divide between the old discourse and the new. From the viewpoint of the new discourse, the national "response is still completely inadequate and only widens the gap, which is needed if you look at the climate signs" (Policy Director, NGO). Nations still prioritise their competitiveness over dealing with the climate emergency:

> *Policy makers are not balancing the economic interests against broader societal interests… So that's something that hasn't been corrected yet and I think remains a problem. (Policy Director, NGO)*

At the national levels, power was divided between developed and developing countries while the rules were institutionalised according to powerful discursive agents such as the US and the EU in the Kyoto-era (Pettenger, 2007). In the Paris period, power is dispersed to multiple actors, including various developing countries and encompassing indigenous people and NSAs. Power can be described as a resisting dynamic that comes from actors and their discourse, neutralising the need and urgency for change. One participant pointed out the rise of power in the developing countries' narratives, which align with the climate emergency discourse.

> *So particularly small island developing states, the G77, you know a lot of the least developed countries, they have real power within the negotiations because it is understood that they have been hit the worst to zero faults of their own. You know, particularly interventions where heads of states having to explain they are buying lands in other countries to move their entire population to because there has been a loss in the islands they live on, you know. People can't really argue with that. (Policy Director, Investors NPO)*

Incremental Change of Institutions

The change in actors, discourse and their changing power all point towards a change in institutions, the rules of the game. However, the rules of the game change in an evolutionary way. The current rules have aspects of both the old "top-down" state-centred multilateralism of the Kyoto-era and the new "bottom-up" voluntary actions of the Paris Agreement. The new rules seek to address the revealed weaknesses, including the failure to achieve a globally binding agreement. The rules of the game in the Kyoto-era sought economic efficiency and a level playing field within the context of neo-liberalism (Meckling & Allan, 2020). However, the new rules have evolved to address shortcomings related to environmental integrity and social justice revealed in the Kyoto regime. The rules have changed incrementally, not fully aligning with the climate emergency discourse:

> *To be honest, I've been in COPs in and out over the last 20 years, it's frustratingly slow. And I see too little change. (former Government)*

Although the actors, discourse, and power have been changing, they are not enough to change the rules of the game. The broader social and political context of protectionism is also hindering radical change in the negotiations:

> *So, finding a sort of internationally coordinated solution in the nature of trade wars is difficult. (Professor 1, Research)*

To conclude, the climate policy in the Paris-era manifests an incremental evolution. Due to the expansion of the range of involved actors, there is competing discourse of keeping competitiveness and climate emergency in the policy arena. The power is moving due to public awareness and policy failure, however, it is divided between old sustaining powers favouring economic competitiveness and the new narratives. Finally, the rules involve both approaches to maintain economic efficiency and address environmental integrity and social justice. The hybrid architecture emerged in global climate governance: a combination of bottom-up polycentric initiatives with top-down targets and a timeline (Bäckstrand et al., 2017; Kuyper et al., 2018; Green et al., 2014; Keohane & Victor, 2011). In the following section, we demonstrate how the institutional change is manifested in the change of carbon markets and their linking.

4.4.2. Change in Carbon Markets and Linking: from Global Linking to Fragmentation

The failure of COP 15 in Copenhagen undermined expectations about globally linked carbon markets. There is increasing awareness that carbon markets alone cannot address climate change (Chief Economist, NGO) and that the Kyoto model of globally linked carbon markets does not work. While linking is advocated for improved economic efficiency, no country wants to see a financial flow to another country due to differences in carbon prices. There are also complex power and governance issues that hinder linking: “as much as EU has been thinking about linking for last 10 years, it showed how it has been difficult” (Policy Advisor, Government).

The discursive power of the climate emergency has affected institutions of carbon markets linking. The radical civic environmentalism discourse is against carbon markets (Bäckstrand & Lovbrand, 2019). As one participant mentions, “normally these social movements [regarding climate emergency] are not very favourable for market mechanisms” (Managing Director, Research). The Paris narratives instead focus on “ratcheting up in NDCs and things like that. It isn’t about starting a carbon market” (Professor 1, Research).

However, the carbon market survived as a compromise in the Paris-era. They were framed as one of the key solutions to tackle the climate emergency. According to Blum (2020), despite their contestation, trust in carbon markets remains high under the Paris Agreement. Many participants considered that carbon markets will have a role: "because this climate crisis will not go away and people and governments will need to look to implement solutions" (Policy Director, NGO); and carbon markets "have an excellent way of bridging short and long term goals, and a way of helping achieve the political consensus" (Director, Media). Economic efficiency remains a core argument for carbon markets:

> *But you certainly can get much faster, much earlier…much cheaper, rather than starting with the most expensive ones. Sounds a little bit counterintuitive. So, is it an emergency or is it not? And there is no public money. Let's face it. (Executive Director, Business NPO)*

Although the climate emergency discourse has growing ideational power to curtail carbon markets, the rules have only changed slowly and incrementally. The discursive power of economic competitiveness collides with the new narrative that the global carbon markets are not the solution to the climate emergency.

The negotiation of Article 6 of the Paris Agreement on market mechanisms exemplifies the collision of the ideational powers striving to change the rules of the game. The vision for the Paris market mechanism involves "expansion of scale and a movement away from the expectation that there will be one international market" (Chief Economist, NGO). The New Market Mechanism of the Paris-era should target broad areas of the economy with robust standards ensuring environmental integrity (The European Union, 2012). In the Paris Agreement's Article 6.2, linking was re-phrased as "International Transfer of Mitigation Outcomes (ITMOs)", a voluntary and nationally cooperative approach to transferring mitigation efforts across the national commitments. Many understand ITMOs to encompass international linking of market mechanisms (Correspondent, Media), although it does not imply a single, globally linked carbon market.

Article 6.4 is an evolved version of a Kyoto Mechanism such as the CDM: for example, it involves a credit mechanism that enables mitigation through sustainable development. Agreeing on the rules of Article 6.4 has been contentious because the CDM was criticised for the lack of additionality and negative impacts on local communities (Carbon Market Watch, 2019). Article 6 should ensure robust accounting rules, involve local communities in projects and help avoid hot air with ambitious targets (Policy Director, NGO). While some

stress that the New Market Mechanism should build on the Kyoto Mechanisms (ICAP, 2015), others argue it should replace them. In the "Global Call to end CDM" (2018), 99 NGOs have called for the discontinuation of the CDM when the Kyoto Protocol period ends in 2020. The contestation over the CDM exemplifies the clash between the old and new discourses of keeping economic competitiveness and climate emergency. Some expect the CDM to survive due to its economic efficiency merits and vested interests (Policy Advisor, Government) while others call for a radical change.

The Article 6 negotiations were tedious and controversial due to the collision of old and new ideas and powers. The clash created inertia to the development of carbon markets and their linking under the Paris Agreement. Creating the rule book for Article 6 was delayed from COP 24 (2018), was not concluded in COP25 (2019), and was further delayed until the year 2021 due to the COVID-19 Pandemic. Article 6 was difficult to negotiate because it entails "both technical and political aspects" (Director, Business NPO), and the contention focuses on robust accounting rules for mitigation transfers, the governance structure of carbon markets, and to what extent the Kyoto mechanism legacy will be continued (Marcu, 2019).

> *There is almost an ideological fighting of market mechanisms in Article 6. This is basically due to the failure in the CDM. Also, there are two schools of thoughts in Article 6, [one] involves voluntary collaboration and on the other hand, there is another group that says it's still similar to the Kyoto and it needs top-down oversight not to contaminate the system…The rules of the game change depend on how much of the CDM legacy will be transitioned. (Managing Director, Research)*

The domain of carbon markets linking also highlights how the broader institutional context affects change. The world has moved towards protectionism after a change in leadership and positioning of countries such as the US and China. The era of trade wars after the global financial crisis has highlighted increasing fragmentation in the carbon markets.

> *The idea of global carbon market 15 years ago was a very strong one...we were in a sort of globalized place then where everything was deregulating, and the world was getting much smaller. So, I think, you know, the emissions trading was born out of that mission. So, global carbon market is, in my regard, it is very much in line with free trade. It was the free trade movement...and then with the global recession, then*

> *forget it, the world started to move in a different way. We're seeing even greater protection trend I suppose. So, it becomes much more fragmented, the idea of carbon markets. (Director, Media)*

The linking Ideas are changing to involve mini-lateral linking among close trading partners (Falkner, 2016a) or "specific deals with countries that are involved in very specific kind of emissions trading in a limited basis" (Director, Media). The EU's plan for Carbon Border Adjustment Measure (CBAM) also reflects the broader institutional context of protectionism in climate actions (former Government). The approach is in line with the continuation of the EU's leadership in the global climate policy, however, it demonstrates fragmentation with the idea that "We don't wait for the whole world to agree on cooperation" (Chief Economist, NGO).

Carbon markets will remain a tool to mitigate GHG emissions in the Paris-era as the discursive power of keeping economic competitiveness persists. However, the linking story has been changed by the climate emergency discourse and the institutional context. Many participants observed that there is limited interest in promoting global linking through Article 6 in the Paris-era, especially as powers such as the US, EU and China show little interest in it.

The case of global carbon markets resonates with the change in the global climate policy of the Paris-era. The discursive coalition of the climate emergency has strived for an institutional change. However, the change of rules and institutions is still incremental and has not left previous ideas and practices behind. The institutions only change slowly under the collision with the sustaining discourse and powers and the broader social and political context.

4.5. Concluding Discussion

We found that the discursive power of the public has grown as they have learned, talked, and acted on the climate emergency narrative. The Paris-era involves a mixture and collision of discourses, powers, and rules of the game, which make the institutions constantly changing. We also found that the change in the global carbon markets and their linking reflects the dynamics of the global climate policy.

The climate policy and carbon markets in the Paris-era exemplify the "renewal" of the Kyoto-era institutions by "hybridisation", where new power and rules intertwine with the old (Arts and Leroy, 2006). Climate institutions develop in incremental steps, as new

institutions are tried out and found to be ineffective. Actors challenge policy legacies to pursue incremental strategies leading to path-departing change referred to as “layering” (Streeck and Thelen, 2005, p.22-24). Layering is defined as “elements attached to existing institutions gradually changing their status and structure” (Streeck & Thelen, 2005, p.31). In our case, the global climate policy domain learned from the failure in creating a top-down agreement to try a bottom-up approach. Carbon markets learned from low prices and drawbacks of the Kyoto mechanisms, which led to rule changes. Failure to establish a globally linked carbon market led to fragmentation. Actors learn from failures, and the learning is reflected in their discourse. We find that actors’ discourse constituted the negative feedback that led to the layering of the institutions in climate policy through the change in the balance of power in the Paris-era.

Actors construct institutions while they are also bounded by existing powers and rules. Actors are sentient and think, speak and act to construct institutions, while they have “foreground discursive abilities” and “background ideational abilities” (Carstensen & Schmidt, 2016). We find that actors are bricoleurs (Carstensen, 2011) who amalgamate new ideas into existing ideas and institutions, leading to evolutionary change in climate policy. In addition to finding that actors’ interests and uncertainty led to path-dependent incremental change in climate policy (Keohane and Victor, 2011), we add that the broader social and political context affects institutional change.

Climate emergency discourse demonstrates power through ideas, while “maintaining competitiveness” persists and resists change through *power over ideas*. The discursive power of climate emergency has not yet been sufficient to transform institutions due to the *power in ideas* of maintaining competitiveness and the institutional context of protectionism. *Power in ideas* is explained as an institutional power that dominates and structures thoughts that is deeply embedded in the institutional structure. It concerns “the institutional setup of a polity or a policy area that enhances or diminishes the ability of actors to promote their ideas” (Carstensen & Schmidt, 2016, p.323). The attempt to change climate policy and carbon markets through climate emergency is controlled by the institutional power of the broader institutional context. For example, the global financial crisis of 2007-2008 weakened the idea of globalisation and the belief in free trade, contributing to a failure to agree on top-down global climate policies in 2009 and to fragmentation in the climate policy and carbon markets. It implies that the contemporary economic and political context should be examined as part of the problem when dealing with climate governance. Overall, we conclude that the discursive power of climate

emergency is not sufficient for attaining the Paris goals, which would require a transformation of institutions.

Despite their contestation, Blum (2020) argued that carbon markets will continue to play a role in the Paris-era as stakeholders have legitimised a storyline that, with reforms, the market mechanism will help achieve the Paris goals. Carbon markets remain a compromise for parties to reach their ambitious goals. Carbon markets reflect old ideas of green governmentality and ecological modernization of the Kyoto times (Bäckstrand & Lövbrand 2007), but are suggested as a way to achieve bottom-up pledge and review process of the Paris-era. Some actors argued that market ideas should be off the agenda to deal with the *climate emergency,* while others frame carbon markets as an effective means to tackle the *climate emergency*. The case of the carbon market contributed to showing that the climate emergency, which embeds rising civic environmentalism was not enough to challenge to dominate the persisting narratives of the Kyoto times.

Carbon markets linking remains on the global agenda, but with a changed emphasis on fragmented mini-lateral links due to the change in discourse and power dynamics. Although the approach lacks normative and sociological legitimacy, Karlsson-vinkhuyzen and Mcgee (2013) argued that the mini-lateral forums were introduced by powerful states for an exclusive negotiation process and voluntary approaches in the UNFCCC process.

Bäckstrand et al. (2017) argued that the Paris Agreement institutionalises the "intricate interplay between state and non-state multilateral and transnational climate actions" (p. 569). Previous studies dealt with how discourse interrelates with institutionalisation focusing on the actors and their new ideas in climate policy and carbon markets (den Besten et al., 2014; Fitch-Roy et al., 2020). By adding the concept of "ideational power", we contributed to demonstrate how and to what extent a discourse becomes institutionalised through power struggles in the Paris-era. We suggest paying attention to how power works when trying to make an institutional change in the Paris-era.

A change of actors and the emergence of new policy discourse is not enough for institutionalisation. Some have argued for caution in the use of climate emergency frame as a strategy because it can enhance technocratic solutions that may not steer towards long-term just solutions (Hulme, 2019; Patterson et al., 2021). Our study found that the climate emergency discourse is connected to public awareness and its rising discursive power, however, it was not enough to drive institutional change that is sufficient to deal with the scale of the demanding threat. More research is needed to understand the gap

between the discourse and institutional change and how to close it. Hence, a future research agenda should involve understanding how the climate policy discourse can be legitimised to gain more power, challenging established *power over ideas* of maintaining economic competitiveness and *power in ideas* of institutional context like the economic crisis and protectionism.

In all, we demonstrated how the climate policy changed from the Kyoto to the Paris-era through the change in actors, discourse, and ideational powers. The institutions only changed incrementally due to the crash of ideas and powers, highlighting the gap between what needs to be done and how they are institutionalised in practice. Our results indicate how the hybrid institutions of climate policy and polycentric and fragmented carbon markets do not align with the climate emergency discourse. We further argue that the broader social and political context reflects the institutional power that limits a radical change in institutions. We propose to shed new light on the power dynamics when striving for the institutionalisation of climate policy and carbon markets.

Chapter 5. The Divergence of South Korea's ETS from the EU ETS - An Institutional Complementarity View

5.1. Introduction

The Kyoto Protocol (1997) suggested the Emissions Trading Scheme (ETS) as an efficient solution for climate action. There are currently 25 ETSs across the globe from supranational to local and jurisdictional levels, and the carbon markets are expected to expand under the Paris regime (ICAP, 2022). The EU, China, Kazakhstan, Mexico, New Zealand, South Korea (hereafter Korea), Switzerland, and the United Kingdom are examples of countries and regions that have implemented ETS. Carbon markets are socially constructed, and their development and change involve political processes (Stephan & Paterson, 2012). The ETS designs are thus heterogeneous and fragmented due to local politics and divergent institutions (Gulbrandsen et al., 2019).

How did the European Union's Emissions Trading Scheme (EU ETS) and the Korean Emissions Trading Scheme (K-ETS) evolve differently and what are the reasons for their divergence? We examine how the characters and designs of these ETSs did diverge due to the different institutional arrangements within which the systems are embedded. We compared the K-ETS to that of the EU-ETS as the latter has been considered a model for the design of other ETSs across the world (Narassimhan et al., 2018; Park & Hong, 2014). We demonstrate that the EU ETS evolved to complement its political structure and energy liberalisation, while the K-ETS adapted to become regulation-like in order to be compatible with its institutional environment.

5.2. Literature Review

Carbon markets emerged in the Kyoto period as a political outcome and diplomatic bargain under the leadership of a powerful epistemic network (Calel, 2013). Developed countries intended to include market mechanisms in the Kyoto Protocol due to their economic efficiency, and as a way to bring developing countries on board in the climate change negotiations (Bulkeley and Newell, 2010). They were also seen to improve political acceptability to business actors due to their greater flexibility and opportunity to construct a new market under the neo-liberal regime (Bailey & Maresh, 2009). In the Kyoto times, a globally linked carbon market was envisioned.

The EU ETS is the largest and oldest carbon market which was adopted in 2005 to meet the Kyoto targets, demonstrating the leadership of the European Union in climate policy. Although the creation of globally linked carbon market failed, ETS have expanded globally over time. The Korean ETS (K-ETS) was adopted in 2015, and it was the first national ETS in East Asia. At the time of implementation, the K-ETS was the second largest mandatory ETS after the EU ETS (ICAP, 2022). The EU ETS and the K-ETS are comparable in that they both used ETS as a tool to manage greenhouse gas emissions from energy production and energy-intensive manufacturing industry sectors. They both adopted net-zero as the 2050 target under the Paris Agreement which positioned them as leaders in climate policy.

On the other hand, the EU ETS and the K-ETS are not compatible to compare in a quantitative manner because their size and development stages are different. For example, the EU ETS covers 1749.5 Mt CO2e (2018) and K-ETS covers 601.9MtCO2e (2018). The EU ETS has been implemented for more than 15 years, and it is in the matured stage of phase 4 (2021-2030) after several trials and errors. The K-ETS has been running for 7 years and it has entered the Phase 3 (2021-2025). Therefore, we compared the two qualitatively, focusing on their divergence due to differences in their institutional environments which includes factors such as the nature of political structures and the degree of energy market liberalisation. It is important to make the comparison to draw lessons for the future development of the K-ETS, as it learned from the EU ETS at the design stage and has followed its path of development. The analysis of the K-ETS can also offer lessons to other emerging and developing countries which are planning to adopt an ETS under the Paris regime (ICAP, 2022).

The EU is characterised by “inter-governmentalism”, a complex of different modes of governance at different levels and scales (Kaiser, 2002). It is not easy to define the EU as a state as it is not a sovereign nor has demos (Jolly, 2007). However, it has structures that perform state functions. The EU does not fit the classification into executive, legislative, and judicial organisations of a sovereign state, but the EU Commission serves as an executive (Lijphart, 2012). Multiple interests of member states and different sectors are coordinated, and the process of negotiation shapes policy design. This structure results in a policy network of diverse stakeholders, with the EU commission acting as a moderator of the network. Wang and Paavola (2022) demonstrated how the decentralised powers of the EU legislative triumvirate (the EU Commission, European Parliament, and the European Council) fostered consensus building in the EU ETS to accommodate heterogeneity in the policy process.

Many scholars have evaluated the K-ETS and the EU ETS. Park and Hong (2014) examined K-ETS design in comparison to the EU ETS before the former's adoption and anticipated challenges in the allocation of allowances; managing allocation reserve and market stability measures; controlling the capital market; and the impact of electricity sector regulation. Narassimhan et al. (2018) in turn compared eight ETSs worldwide, including the EU ETS and the K-ETS, to assess their environmental effectiveness, economic efficiency, market management, revenue management, and stakeholder engagement. In their view, the main differences between the EU ETS and the K-ETS lie in the allocation process, market management and revenue management. However, these comparisons have not examined the reasons for the divergence of ETSs. Oh, Hyon and Kim (2017) did analyse how the adoption of the K-ETS was possible in an emerging economy, explaining its governance structure and how the design was compromised due to vested interests. However, they focused on agenda setting.

Others have assessed the EU ETS and K-ETS designs in light of their compatibility for future linking. For instance, Hawkins and Jegou (2014) examined the similarities and differences between the EU ETS and K-ETS designs, identifying barriers to linking arising from the K-ETS provisions. Doda and Taschini (2016) have shed light on under what conditions and to what extent the linking of the ETSs can be economically efficient, but they paid limited attention to the social, political, and institutional environments within which ETSs are embedded. Here, the term institutions refer to "both formal organisations and informal rules and procedures that structure conduct" (Steinmo, Thelen and Longstreth, 1992, p.2). Climate policies including the ETSs emerge and evolve in different institutional settings (Stephan & Paterson, 2012), and they work differently in different institutional environments (Bergquist et al., 2013; Ostrom, 1990). We contribute by exploring how institutional arrangements affect the character and evolution of the ETS designs and explain the reasons for their divergence.

Institutions are affected by incumbent structures, and they develop complementary to established political economy (Aoki, 1994; Amable, 2011; Hall and Soskice, 2001). Institutions are complementary when "the presence (or efficiency) of one increases the returns from the other" (Hall & Soskice 2001, p. 17). Complementarity is the force that sticks institutional forms together, and results in an incremental institutional adaptation (David, 1994). A new institutional arrangement interacts with and adapts to the pre-existing institutional environment through layering and conversion (Streeck & Thelen, 2005). The complementarity of two sets of institutions is context dependent, i.e.

dependent on whether they are compatible with established social and economic ordering (Boyer, 2005). Boyer (2005) has distinguished the concept of compatibility and coherence from complementarity: Institutions are *compatible* if their coexistence is at a stable equilibrium; and they become *coherent* when the coexistence is justified by their strengthening of each other; and finally, institutional *complementarity* is reached by when conjunction offers greater resilience and performance.

Institutional complementarity scholarship has discovered how the market institutions have adapted differently in different nations due to their broader institutional arrangements (Aoki, 1994). However, the conceptual framework has seldom been used to analyse climate policies. Watkiss, Benzie and Klein, (2015) did review the complementarity of climate mitigation and adaptation policies at the global, national and local levels. Magnin (2018) explored institutional complementary by analysing how different forms of capitalism adopted sustainable development policies that are compatible with their established institutions. However, the approach has not been used to date to investigate how climate policies and ETSs have evolved differently within different political structures and different degrees of energy market liberalisation.

Hall and Soskice (2001) suggested that national political economies can be classified as Liberal Market Economies (LMEs) or Coordinated Market Economies (CMEs), and that different political economies generate different institutions that complement existing institutional frameworks. Institutional complementarities reinforce differences, so a nation with a particular type of coordination in one component tends to generate complementary solutions in the other spheres. In LMEs coordination is secured through competitive market arrangements, while CMEs use policies such as government interventions that reinforce the capacities of actors for non-market coordination. For example, Fioretos (2001) demonstrated how Britain and Germany shaped national preferences over the Maastricht Treaty because of their different institutional make-up as LME and CME.

Political structure and political economy affect the design and performance of climate policy. For example, Finnegan (2022) explains how electoral rules and interest group mediation drove variations in climate policy investments: countries with proportional electoral rules and interest group concertation have the highest level of policy stringency, and majoritarian democracies with plural interest groups are associated with lower stringency. Consensus democracy with CMEs co-occurs with concertation, and the interest groups are incorporated into the process of policy formation (Lijphart, 2012). Majoritarian

democracy with LMEs is associated with the interest group pluralism – they are competitive and uncoordinated through market mechanisms (Finnegan, 2022; Lijphart, 2012).

However, Korean climate policy does not really fit the categories suggested by the above studies. It has majoritarian democracy with a semi-presidential political system. The power divides within the government to form two separate policy networks with frequent turnover in power through presidential elections. However, energy sector and climate policy interest groups are not plural. The political economy is rather coordinated because the energy market is not liberalised, and the electricity sector is largely owned and regulated by the government. On the other hand, the EU's energy market is liberalised, and the political economy of the energy sector and climate policy is thus plural. Climate policy is significantly affected by the structure of energy markets and their political economy because energy production is the main source of greenhouse gas (GHG) emissions (International Energy Agency, 2021).

The ETS design is dependent on how the energy market is structured (Acworth et al., 2020). Boute (2022) points out the limits to transplanting the EU ETS model to emerging economies and argued that an ETS should be reconceptualised as a mechanism that integrates regulatory energy markets. Kuneman et al. (2021) specifically studied how the electricity sector regulations affect carbon price and abatement opportunities of the K-ETS and considered that ETS plays a limited role in the low carbon investment. The market principles do not fully work in the K-ETS because the electricity supply follows the cost-based merit order, which does not consider the carbon price (Gun et al., 2021). The government regulates electricity supply based on economic, political, and technical considerations so that what the ETS should deliver does not materialise (Acworth et al., 2020).

We seek to qualitatively evaluate how the institutions mattered in the development of carbon markets, highlighting how the political structure and political economy of the electricity sector is shaping the character and design of the policy. We seek to understand how and why the EU ETS and the K-ETS evolved differently owing to their different institutional arrangements, and to what extent an ETS complements its incumbent institutional structure to shed light on the implications for their futures under the Paris regime.

In the following section, we explain the materials and methods used. In the Results section, we analyse how the incumbent institutions affect the policy character and ownership of the

carbon markets and demonstrate that the ETS design elements adapted only incrementally despite the emergence of the Paris regime. We then discuss our findings and conclude.

5.3. Materials and Methods

We used policy documents and expert interviews as materials for analysis to understand how the EU ETS and K-ETS evolved in their institutional environments. Boyer (2005) suggests that the complementarity of various institutions arises from the interaction of agents within a given institutional context. Ideas of agents also have explanatory power in relation to institutional stability and change (Hall, 1993). We seek to understand how the ETS is complementing established institutions by observing how agents interact with ideas in the climate policy sphere. We considered that the oral and written communications of multiple policy actors such as the government, industry, and lobby groups, research, civil society, and media explain how the ETSs evolve within their institutional environments.

We analysed over 200 documents to identify key actors and their interactions. We focused to find formal institutions through documents. They included legal documents, the government and national institute reports, seminar reports, and position letters relating to the EU ETS and the K-ETS. Grey literature of think-tanks and NGOs and academic literature were also analysed. In addition, we conducted interviews to discuss how the actors are institutionalising ETSs in the EU and Korea. We focused to find informal institutions by asking participants why the ETS design was adapted in such a way. Twenty expert interviews were conducted in Europe between October 2019-March 2020 and another twenty in Korea between August 2020 and June 2021. The participants were identified as part of the analysis of documents on the basis of their visibility and influence, and referral sampling was also used.

In all, 20 face-to-face interviews were conducted in Leeds (2), Brussels (4), London (6), and Seoul (8). Another 20 interviews were conducted over video conference calls. They included interviews with experts from the government sector (9), academia (7), consultancies (9), Non-Governmental Organisations (NGOs) and civil society (7), industry and related Non-Profit Organisations (NPOs) (6) and media (3). The interviews were semi-structured with open-ended questions, and they lasted between 30 to 60 minutes. Institutional ethical clearance was obtained before data collection commenced. Informed consent for participation was collected before each interview.

We used thematic analysis to identify different characteristics of the EU ETS and the K-ETS, and coded and reported the data. The key variables for differences were identified as

categories for coding: the political structures and energy sector management institutions. The design elements of ETS post-2020 (EU ETS Phase 4 and K-ETS Phase 3) were categorised again to compare how they differentiated due to the interactions with established structures and institutions.

5.4. Results

In Section 5.4.1, we characterise the EU ETS and the K-ETS and reflect on their development over time considering political structure and the degree of energy market liberalisation as key variables explaining their divergence. We then compared the design of the EU ETS phase 4 (2021-2030) and K-ETS phase 3 (2021-2025) in Section 5.4.2. to shed light on their divergent evolution during the Paris-era.

5.4.1. Characterising EU ETS and K-ETS

Characteristics	EU ETS	K-ETS
Government Intervention	Rule-based	Discretionary
Rule Change	Long-term, stable	Short-term, frequent change
Stakeholders Engagement	Engaged	Not engaged
Ownership	Market participants	Government
Character	Market	Regulation
Legitimacy to Stakeholders	High	Low

Table 5.1. Comparing characteristics of EU ETS and K-ETS. The characteristics diverge due to different institutional settings such as political structure and energy liberalisation.

EU ETS

The EU ETS was adopted in 2005 as a pioneer, and it has evolved as a result of learning by doing over three phases until 2020. In its adoption, the EU ETS was decentralised, and the allocation process was compromised to gain the cooperation of stakeholders (Bailey & Maresh, 2009). The compromised allocation process led to over-allocation. A major carbon price crash also occurred in phase 2 due to the financial crisis, over-supply of international carbon credits, and conflict and overlap with renewable energy policies (Koch et al., 2014). The EU Commission (EC) framed these drawbacks as a learning process and attempted structural reforms of the ETS.

LaBelle (2012) considers the EU ETS an example of hierarchical governance with a single market and mechanisms based on law, where power is delegated to the EC based on prior

negotiations and legislative activities. The EC intervened in the carbon market in order "to make the EU ETS more resilient in relation to supply-demand imbalances" (EC, 2015) by adopting the Market Stability Reserve (MSR) in 2019.[5] The EU ETS also back-loaded accumulated over-supply in phase 2 (2008-2012) and limited the use of international offset credits from Phase 3 (2012-2020). However, the interventions are rule-based: they take long to adopt or change because of multiple consultations and stakeholder engagement.

The carbon market is considered an "odd thing" because it "exists because of the regulation" (NGO 3). Government intervention is inevitable to secure carbon market stability. The principle of subsidiarity allows the EC to intervene since it is about "setting standards which will affect the internal market of the Union" (EU Commission 1). The EU carbon market ensures long-term signals and makes sure of the continuity of the policy, and stakeholders are engaged in the process of the rule change.

> *the EU policymaking process ensures a lot of credibility and stability so people know that you know the ETS for example is there to stay they will not go away…so that also provides a strong signal to stakeholders and covered entities. (Industry NPO)*

The engagement of stakeholders evidence policy ownership. The EU strives to give more ownership to market participants as it translates into the legitimacy of the policy. Most of the study participants considered the EU ETS to be fully legitimate to actors entrenched in the EU system. The culture of engagement makes it "a huge exercise in governance" that gives ownership to the market participants (EU Commission 1).

> *It's a market. You bring stakeholders in…You cannot put everything into the legislation, and the market is important for this, for developing this feeling of ownership and having different players working together, competing together. (EU Commission 2)*

The liberalisation of energy markets in Europe contributed to its readiness for ETS implementation. Energy market liberalisation started in the United Kingdom in the 1980s under the neo-liberal paradigm, soon after the EU started to implement reforms to liberalise its power market (Pollitt, 2012). When the ETS was adopted, the EU power sector

[5] Decision (EU) 2015/1814 http://data.europa.eu/eli/dec/2015/1814/oj

was ready for carbon markets as it was like just adding a carbon commodity to the already functioning energy market (Academia 1):

> *You have to remember in that stage [in the early 2000s] the power sector had just gone through the liberalisation process. So, we were used to competition. And we had the trading desks, they were trading electricity and gas, we basically looked in and said, "here's another commodity – we know how to trade that[carbon]". (former EU Power sector)*

The compliant industry, investment companies, and consulting firms were already building carbon market infrastructure before the implementation of the ETS based on their experience with the Kyoto mechanisms in the early 2000s (Academia 2).

> *In the end, in fact, the industry has organised itself. You know market players themselves decided to trade carbon. (former EU Commission)*

In short, the EU ETS can be characterised as a market with stakeholder ownership that involves rule-based interventions when needed. The stability of the long-term policy originates from a multilateral and decentralised political structure. The EU's existing institutional architecture of political institutions and energy market liberalisation contributed to the legitimacy and ownership of the carbon market.

K-ETS

The K-ETS was modelled after the EU ETS and adopted in 2015, but it evolved to have its own rules. A Korean government official puts it: "We created our own style" (Korean Government 2). The initial K-ETS design was a by-product of a political compromise amid a conflict of interests (Park & Hong, 2014). The K-ETS is evolving by moving from free allocation to auctioning, and the allocation method is changing from one based on historical emissions to a benchmark of efficient installations. The market management rules are also changing to activate the market.

The K-ETS has had a fairly stable carbon price owing to active government intervention. However, the K-ETS phase 1 (2015-2018) experienced illiquidity (Etienne & Yu, 2017). In the earlier implementation, there were very few transactions, and the market suffered from volatility. The government made several interventions to change rules to manage the carbon price (Asian Development Bank, 2018). For example, it decided to auction some allowances from the market stabilisation reserve, and changed the rules to allow increased borrowing from later compliance years of up to 20% in 2016 (Asian Development Bank,

2018). The government also allowed domestic offset credits earlier than planned to deal with liquidity.

In comparison to the EU ETS, the rules of the K-ETS can be changed easily and quickly (Media 3). Korea has big and active government, and the presidential majoritarian politics contributes to frequent changes in rules. There was a change in the presidencies that affected the governance of the ETS. For example, when President Park Geun-hye of the conservative party was elected in February 2013, the competent ministry for ETS changed from the Ministry of Environment (MOE) to the Prime Minister Office (PMO) and then to the Ministry of Strategy and Finance (MOSF) in 2016. Under President Moon Jae-in (term May 2017-2022) administration with the major Democratic Party, the MOE became again the competent authority with extended responsibilities.

The K-ETS regulations delegate authority to the government to intervene for allocation adjustment and market stability when needed (Table 5.2). The discretionary intervention poses questions about the transparency of the process and increases uncertainty to the stakeholders leading to low legitimacy. Several participants highlighted that the K-ETS is like a regulation where the ownership of policy lies with the government rather than a market. It resonates with the finding of Suk, Lee and Jeong (2018) that the firms perceive the K-ETS as a compliance mechanism:

> *The government is changing the scheme continuously, so nobody sees trading as an opportunity. If they become active, they must be responsible for their investment when there is rule change. So, the firms are mostly passive to ETS. (Consultancy 4)*

One participant said that the Ministry of Environment (MOE) has “regulation DNA” which is a challenge for managing a carbon market (Korean Government 2). The MOE was established in 1994 when the government started to develop environmental policy independently from the industrial policy. Before this, environmental policy was present only to regulate industrial pollution when the state priority was the rapid industrial development (Heo, 2013). Thus, the industry still tends to oppose environmental regulations creating a gridlock for ETS adoption (Heo, 2015). The ETS implementation was considered top-down without sufficient legitimisation (Yun and Won, 2012).

The ETS is also perceived as a regulatory mechanism because it has its roots in the command-and-control system Target Management System (TMS) which Korea

implemented in 2012 to regulate energy generation and industries. The government allocated an emission target to the energy and industry sector installations, and they had to pay a fine if the target was not met. It was intended to act as a pilot phase of ETS, however, it also led to regulatory path-dependency with the ETS. Kim (2016) indicates that the Korean industry sector advocated TMS over ETS before the ETS adoption as they would pay a modest fine rather than exposing themselves to an uncertain carbon price, and the target setting is more open to negotiation between the government and companies.

The Korean electricity sector is managed and controlled by the government. The power generation company Korean Electric Power Corporation (KEPCO) is a public corporation that transmits and distributes electricity, and the government owns more than half of its share. Most power companies are subsidiaries of KEPCO. Korea does not plan to liberalise the power sector in the foreseeable future. The government established KEPCO and centralised the planning and took control of the governance of power supply for the state-led economic development from the 1970s (Lee & Ahn, 2006). A reform of the electricity generation and tariff system was attempted after the economic crisis in 1997 to gradually privatise the monopolised market, but it failed due to political struggles and lack of social acceptance (Lee & Ahn, 2006). The electricity sector reform is politically challenging due to energy security concerns in the context of energy intense industrial development (Chung & Kim, 2018).

In theory, an ETS is efficient when the energy market is liberalised because then the carbon price is reflected in energy production and passed on to consumers (Acworth et al., 2020). Korean main industries like steel, petrochemical, and cement production are energy intensive. The electricity consumption accounts for 78.4% of industry GHG emissions (2018) (The Government of Korea, 2021b p.45). To adapt to the regulated electricity market, K-ETS is designed to include direct emissions from the energy production process and indirect emissions from electricity consumption. This seeks to address the incomplete pass-through and reduce the market power of generating companies (Kim & Lim, 2014; Shim & Lee, 2016). However, the design caused inefficiency in the early phases of the K-ETS. Because carbon price was not reflected in the energy tariff, it did not fully incentivise energy source switch and low carbon investments.

> *This is a systematic problem. Our country uses cost-based merit order in the energy sector...When there is an ETS cost, KEPCO subsidises the cost. (Academia 3)*

To address the shortcomings, Korea planned to adopt an environmental merit order dispatch, so that carbon cost is reflected in the retail tariff from 2021. However, even the adoption of the environmental merit order is not sufficient for incentivising fuel switching and low carbon investments (Kuneman et al., 2021). A participant suggested that it does not make a significant difference within the government regulated electricity market structure.

> *In the end, nothing is really changed. The government is supporting the cost. The public is paying the cost…So the fundamental change is not made still (Korean Government 3).*

To conclude, the K-ETS can be characterised as a regulation that involves frequently changing market rules, and where the ownership of the market lies with the strong government. The political structure of state-centric model, regulatory tradition, and the regulated electricity market turned the K-ETS into a regulatory ETS which adapts to established institutions in an incremental way.

5.4.2. Design features of EU ETS and K-ETS

We examined how the ETS design features differ in the EU ETS phase 4 (2021-2030) and the K-ETS phase 3 (2021-2025) due to their institutional contexts as described in the previous section. We explored allocation adjustment, auctioning and trading, market stability measures, and flexibility mechanisms as key design elements that diverged.

Allocation Adjustment

The EU ETS and the K-ETS adjust allowances differently after the initial allocation. Both enable adding allowances for capacity extension or cancelling allowances for closure or significant capacity reduction. In earlier practice, the EU ETS entity provided evidence to the competent authority to prove that capacity or emission had decreased due to the mitigation efforts in order to prevent allowance cancellation. The EU directive was amended to be rule-based in 2019[6] to adjust allocation when there is more than 15% of activity change (either increase or decrease).

The K-ETS still provides discretionary power to the government to adjust allocation. Adding or cancelling allowances after initial allocation remains a controversy in K-ETS. One

[6] EU ETS Directive (EU 2019/1841)

participant indicated that there is a burden for the entity to invest in mitigation because they fear that allowances will be cancelled when the emission reduces:

> *To avoid getting allowances cancelled, the firm has to get approval from the government that it was an "internal mitigation project". But this has to be done after the mitigation project has been implemented, so the approval is not clear from the start. (Consultancy 5)*

The state-centric style of K-ETS gives authority to the government to approve the allocation adjustments, which increases uncertainty for the firms considering investment decisions.

Auctioning and Trading

The EU-ETS was an open market from the inception, in that allowances (EUAs) are defined as a financial product so financial organisations can trade derivatives in Over-the-Counter trading. Trading is more liquid due to the participation of market makers in the secondary market, and actors are used to auctioning due to the liberalisation of energy markets.

The Korean entity operators are not used to auctioning and trading carbon as commodities in the market (Academia 4). This is partly due to the incomplete liberalisation of energy markets. Moreover, the K-ETS had a fairly closed market system until 2021 excluding third party market makers and it is still in the process of opening up the market to financial products such as futures (Kuneman et al., 2021). A participant explained why Korea is conservative to the operation and management of the financial market:

> *We still have the idea, the trauma from opening up the financial markets. When we open the market, we fear that foreign investors will come to squander and manipulate the market. (Consultancy 1)*

The fear originates from the experience of the financial crisis in 1997. Kwon (2007) argued that the Korean financial crisis resulted from financial liberalisation which began in the 1980s under the pressure from the US and international organisations such as IMF and OECD. The Korean financial crisis was due to the weak domestic financial system and volatile capital flows of speculation owing to financial globalisation (Kwack, 1998; Kwon, 2007). Korea lost control of the financial market when the foreign capital flows made exchange rates unstable.

The K-ETS experienced liquidity and volatility issues until 2020, and the government changed the rules to auction more carbon credits and activate the market through third party participation from phase 3. However, the progress is incremental. Market

participation in auctions is limited to certain sectors and the power sector tends to dominate trading when trading volume is low (Kuneman et al., 2021). Market participants were limited to covered entities and three policy banks in phase 2, and the carbon market opens to the third party incrementally.

> *It is still hard to see that the government has a will for market activation. (Consultancy 2)*

Compared to the EU ETS, unfamiliarity with the auctioning of commodities affects liquidity in the K-ETS. Moreover, the fear of financial crises makes the K-ETS more conservative to open up the carbon market as a financial scheme. The government seeks to stabilise the market when there is a fluctuation in supply and price.

Market Stability Measures

EU ETS implemented a rule-based market stability measure from 2019 to manage the supply-demand imbalance (Table 5.2). The K-ETS has a government-led allocation committee that has a key role in implementing the market stability measure. According to the ETS Act, Article 6, the K-ETS establishes and operates an allocation committee to review and mediate allocation, market stability measurement, emission certification, management of offset and international carbon market linking and cooperation[7]. The committee is administered under the Ministry of Strategy and Finance (MOSF) and its chair has the authority to discuss ad-hoc "agenda that needs review and change". The allocation committee comprises up to 20 members, which include high officials from government ministries and experts appointed by the MOSF, and where the vice minister of the MOE acts as the facilitator of the committee meetings.

The K-ETS market stability measure works to stabilise prices and control the volatility of the market when certain pre-conditions are met (Table 5.2). The ETS Act indicates that when the carbon price is either too high or too low, the government can intervene to control the allowance reserve, limit the holding allowances, limit borrowing from other compliance years or regulate offset credits. It can even establish a temporal price ceiling or floor. The market stability mechanism demonstrates how the government holds regulative power over ETS decision making through the allocation committee, while it gives less flexibility and certainty to the market stakeholders.

[7] Korean ETS Law https://www.law.go.kr/LSW/lsInfoP.do?efYd=20200601&lsiSeq=215913#0000

> *Market intervention decision is made by government officials...It is not systematic, but it is manipulative. Also, you don't know when and how it will happen. It gives much uncertainty since it operates suddenly. (Consultancy 1)*

The market stability measure is an example of the government ownership of the K-ETS: the government regulates stabilising carbon prices through discretionary interventions rather than leaving the market to work.

Flexibility Mechanism (offsets)

The EU ETS was linked to the Kyoto mechanisms like CDM and JI in the earlier phases. However, over a billion tons of CDM credits have been purchased for compliance, which contributed to the supply-demand imbalance in the first two phases (Newell et al., 2014). CDM was also questioned for its efficiency and validity of the emission reductions (Wara, 2007). The EU ETS used CDM and JI as offset until phase 3 (2013-2020) with restricted criteria but does not accept them from phase 4 (2021-2030).

Korea still accepts offsets as a compromise to raise the ambition for 2030 in the post-Paris period (Choi, 2020). The K-ETS accepts offset credits in phase 3, although international credits are limited to 5% of the entities' compliance. The government (MOE) manages and authorises the use of offset. The offsets are also a means by which the allocation committee can control supply as a market stability measure.

> *You have to consult with the MOE to convert offset credits to use in ETS…They try to control this too much…They think they have power over it, and they make it more difficult. It is very strict. (Consultancy 1)*

The K-ETS opened up to accept offsets due to the political compromise for strengthening ambition and liquidity, however, it is allowed under a strict government control to prevent large inflow as happened early in the EU ETS. The strong state model enables the government to take control of offsets to manage the market.

	EU ETS Phase 4 (2021-2030)	**K-ETS Phase 3 (2021-2025)**
Overall Emissions	4,391.9 MtCO2e (2018) -Power 2907.1 (75%) -Industrial Processes 343.5 (9%) -International Aviation 129.2 (3%)	727.7 MtCO2e (2018) -Fuel Combustion (including transport) 632.4 (87%) -Industrial Processes 57.0 (8%) -Agriculture 21.2 (3%)

	-Agriculture 395.4 (10%) -Waste 117.2 (3%)	-Waste 17.1 (2%)
GHG Reduction Target	2030: 40% below 1990 levels[8] 2050: Climate Neutrality	2030: 24.4% below 2017 emissions (536MtCO2e in 2030), 38 Mt international, forestry credits 2050: Carbon Neutrality
ETS Target	43% reduction compared to 2005 levels	4.7% reduction compared to 2017-2019 levels
ETS covered Emissions	1749.5 MtCO2e (2018) 39.8% of EU emissions	601.9 MtCO2e (2018) 82.7%[9] of national emissions
ETS covered GHGs	CO2, N2O, PFCs	CO2, CH4, N2O, PFCs, HFCs, SF6
ETS covered sectors	Power stations and other combustion installations with >20MW thermal input Industry, aviation, others (CCS, NOx etc.)	Heat and power, industry, buildings, transportation, waste, and public sector. Includes indirect emissions from electricity consumption
Compliance	10569 power plants and manufacturing installations	685 entities
Cap	1610 MtCO2e (2021) 1572 Mt for stationary, 38 Mt for aviation Cap reduces by 2.2% yearly	3048.3 MtCO2e (2021-2025) 14mt set aside for market stability, and 20mt set aside for market makers
New Entrance Reserve (NER)	200 million supplied from unallocated NER allowances in Phase 3 (2013-2020)	Reserve for New Entrants and additional allocation: Power sector: 6% of allocation (72.7mln) Other sectors: 4% of allocation (73.5mln) Cancel unallocated NER at the end of the phase, but it can be transferred to subsequent phase through "**Allocation Committee**" decision.
Allocation	Power sector 100% auctioning, Manufacturing /Industry: Free allocation with product benchmarks (Benchmark based on activity levels in 2007-2008, set at average 10% most efficient installations)	At least 10% auctioning, 41 subsectors eligible to auction. Less than 90% free allocation based on benchmarks and historical emission. Benchmark allocation to 12 sectors (grey clinker, oil refinery, domestic aviation,

[8] 2050 Net zero target was set by the Green New Deal (2019) and European Climate Law in July, 2020. Target is updated to be at least 55% reduction compared to 1990 levels.

[9] Ministry of Environment expected ETS covered emissions to be 73.5% for phase 3 period. http://www.me.go.kr/home/web/board/read.do?pagerOffset=0&maxPageItems=10&maxIndexPages=10&searchKey=&searchValue=&menuId=286&orgCd=&boardId=1401250&boardMasterId=1&boardCategoryId=&decorator=

	Subsectors deemed at risk of carbon leakage receive free allocation at 100% predetermined benchmarks. Benchmarks will be updated yearly. Phase 4 cap includes free allocation buffer of 450 million allowances	waste, industrial parks, electricity generation, district heating/cooling, steel, petrochemical, buildings, paper and wood processing) 100% free allocation to 28 Emissions Intense, Trade Exposed (EITE) sectors.
Auctioning **Trading**	57% allowances are auctioned Member states can cancel auctioning and transfer allowances to subsequent auctions when the highest bidding price is significantly below secondary market price to avoid market distortion.	More than 10% allowances are auctioned to 41 sectors. No one bidder can purchase more than 30% of the allowances from one auction. The auctions subject to a minimum price: Financial intermediaries and other third parties can participate in exchange trading since 2021. Futures market will be introduced later.
Market Stability Measure	When Total Number of Allowances in Circulation (TNAC) is above 833million 24% of surplus (12% from 2023) is withdrawn from auction and placed into Market Stability Reserve (MSR) When TNAC is below 400 million, 100 million allowances are taken from the reserve and injected into the market through auctions. From 2023 onwards, MSR holdings above the auction volume of the previous year will be invalidated.	"**Allocation Committee**" implements market stability measures when - the allowance price of 6 consecutive months is at least 3 times higher than the average price of the two previous years - the allowance price of the last month is at least twice the average price of the two previous years, and the average trading volume of the same month of the two previous years - the average market price of a given month is lower than 40% of the average price of the two previous years - It is difficult to trade allowances due to an imbalance of supply or demand The stability measures include: - Additional auctioning of allowances from the reserve up to 25% - Limit to the number of allowances in an entity's account: minimum (70%) or maximum (150%) of allowance of the compliance year - Increase or decrease borrowing limit - Increase or decrease the offsets limit - Temporary setup of a price ceiling or price floor
Banking **Borrowing**	Banking to next compliance year possible. Borrowing is not allowed.	Banking possible, Borrowing possible within the same phase.

		- Borrowing allowed up to 15% by 2021, Borrowing limit rules (2019)[10] applies after 2021 - During 2021-2023, entities can bank up to two times their net amount of allowances (KAUs) and offsets (KCUs). - During 2023-2025, entities' banking limit is equal to their net amount of allowances and offsets sold. - Phase 3 allowances and offsets can only be carried over to the first compliance year of phase 4. (Banking limit in 2025 is the entity's annual average net sold units on secondary market during phase 3).
Offset	Not allowed.	Domestic Offsets (Korean Offset Credits KOC) and international credits allowed up to 5% of submission. - CDM projects operated by Korean companies are allowed with some qualitative limits

Table 5.2. Summary of design features of EU ETS phase 4 (2021-2030) and K-ETS phase 3 (2021-2025). EU ETS design does not incorporate the proposed revision for EU ETS made by the EU Commission on July 21, 2021.

5.5. Discussion & Conclusion

The ETSs have evolved to adapt to the institutional environments. They diverged in their design due to their different institutional contexts and the degree of energy market liberalisation. We explained how the EU ETS and K-ETS governance differed in terms of ownership and legitimacy to stakeholders. By adopting an institutional approach, we demonstrated how the ETSs adapted to pre-existing institutions and gave reasons for why their characters and designs diverge.

We consider that political institutions in the EU were complementary to the long-term climate policy implementation, and that energy market liberalisation contributed to the readiness and ownership of carbon markets among the stakeholders. In contrast, the state-centric political structure and regulated electricity sector undermined the readiness for and

[10] less than surrender Allowance ×{Borrowing limit of the previous year – (ratio of borrowing against surrender allowance× 0.5)}

legitimacy of carbon markets in Korea. The country struggles with a long-term strategy due to the frequent turnover caused by presidential majoritarian politics. The strong government enables discretionary intervention in the national energy production and the carbon market. Although the K-ETS worked well with sustaining prices because of the government's prompt response, it lacks certainty and legitimacy for actors. In short, the K-ETS adapted to become regulation-like to be compatible with the established institutional environment.

We found that energy market liberalisation is key to how the ETS is institutionalised in practice. The EU ETS was adopted due to political feasibility, and it evolved to be *complementary* to its decentralised political structure and its LME in the energy sector. The K-ETS evolved to become *compatible* with its political institutions of the strong state and existing energy political economy of CME. Institutional complementarity disincentivises radical change (Hall & Soskice, 2001). Other measures may have been more coherent when considering the regulation mode of South Korea (Magnin, 2018). Still, the K-ETS strived to adapt to the regulatory policy style and it evolves incrementally under an institutional architecture where the government has control of the electricity market due to unchanging concerns for energy security and industrial development. In particular, the K-ETS included indirect emissions since the electricity price is regulated, and later implemented environmental merit order to electricity wholesale to realise the carbon cost at a later stage.

Howie et al. (2020) suggest that the K-ETS has contributed to the greenhouse gas mitigation based on its coverage of key emitting sectors and the rigour of the emissions cap. However, they did not assess the emission reduction attributable to the adoption of the ETS. Kuneman et al. (2021) examined how the K-ETS design features impacted the quality of the price signal the allowances created and concluded that the regulations in the electricity sector are hindering the carbon market effectiveness and the opportunities for abatement.

Boute (2022) argued that the EU ETS cannot be transplanted everywhere and that it should be reconceptualised in emerging economies that once had socialist values. Our K-ETS case corroborates and extends that argument: it also resonates with contexts where the government regulates the electricity market due to energy security concerns and protection of the competitiveness of the export industry. The past experiences with the failing energy sector and financial liberalisation may sustain the incumbent electricity

market structure. In addition to energy market liberalisation, financial liberalisation affected how the two polities approached trading and managing the carbon market.

We also found that the issues highlighted by Park and Hong (2014) about the K-ETS have progressed only incrementally since its adoption. Although the market stability is there due to the government's active intervention, the structure of the regulated electricity market persists. The government separated the allocation process for direct and indirect emissions to avoid double counting, but market liquidity is still a challenge to K-ETS. The six key differences that were pointed out as barriers for linking by Hawkins and Jegou (2014) remain: adjustment of allocation, government intervention for market stabilisation; coverage of gases and indirect emissions; penalty scheme; acceptance of international offsets; and rules for borrowing. Over phase 3 of K-ETS, they are still evolving to diverge not to mention the difference in the ambition levels.

International Carbon Action Partnership (ICAP), which was established in 2007 to facilitate technical dialogue, knowledge sharing, and capacity building of carbon markets stated that the expansion of the ETS in jurisdictions with a regulated power sector between 2013-2020 raised questions about the potential for carbon markets linking (2023).

> *The realisation of the practical challenges of linking, with system designs strongly rooted in domestic economy considerations, also meant that previous hopes of transatlantic linking and the construction of a single, global carbon market became less feasible. (ICAP 2023, p.206)*

Our analysis of the EU ETS and K-ETS demonstrated how the two system designs evolved to diverge rather than converge due to institutional settings and conclude that they are not likely to link in the Paris-era. We further highlight the importance of considering institutional complementarity when adopting climate policies in the Paris-era. The Paris regime is a reflection of the heterogeneity of institutions. In the context of this diversity, the climate emergency urges for a common goal. The climate emergency should be perceived as a "long emergency", where climate policy demands both short-term and long-term responses (Rogelj et al., 2021). In this regard, we need wisdom about the policy mix ideas to combine different policy instruments (Rogge and Reichardt, 2016) that are complementary to each other.

Howie et al. (2020) emphasised that attention should be paid to the country-specific political and institutional settings when comparing ETSs. We addressed this gap by

comparing the ETS characteristics and designs across the political and institutional settings. K-ETS was evaluated to have high predictability and high accountability and transparency compared to Kazakhstan ETS (Howie et al., 2020). However, in comparison with EU ETS and considering its political and institutional contexts, we find that it still needs to complement the fast-changing regulatory ETS with long-term measures and implement a rule-based intervention that can give more certainty to the stakeholders.

The EU and Korea have both set carbon neutrality targets by 2050 as the long-term goal and have corresponding strategies such as an ETS and the "new deal" in response to the climate emergency. ETS can be useful to bridge the short and long-term goals of climate policy in the Paris-era (Media 2). The EU has learned to complement its slow policy change and plans to strengthen government intervention through the European green deal. EU ETS has become an "insurance policy" to give long-term signals (Academia 5), and the new deal complements with radical and fast interventions for investment into infrastructure and technologies.

Korea can learn from the path of the EU ETS to evolve the system towards complementarity with its established institutions. However, the Korean green deal lacks a long-term vision that enables the harmonisation of policies that can drive energy transformation (Academia 4). Kuneman et al. (2021) stressed the need for a regulatory alignment with electricity sector reforms and highlighted the importance of defining the role of the K-ETS in the broader policy mix for mitigation and low-carbon investment. In all, we suggest that Korean climate policy should work to build policy coherence as a step forward to complement its established institutions under the Paris regime.

> *We adopted a very advanced and ideal system ETS, but actually in the power sector we built coal plants. It is a contradiction, or it may be from ignorance of the climate change problem. (NGO 2)*

It is important to keep in mind that carbon markets are dynamic, and that they change continuously as a response to various endogenous factors as well as to broader political and economic contexts. Our intention has not been to portray the EU ETS as superior to the K-ETS, rather we sought to learn from the EU ETS as a front-runner, more mature market. We drew lessons from a qualitative comparison to conclude that climate policy should evolve towards complementarity with the institutional environment within which it is embedded. We also highlight that the linking of the EU ETS and K-ETS is not likely in the

foreseeable future, as we find more divergence than convergence in their designs due to institutional complementarity.

Further research is needed to discover how various institutional architecture of both developed and developing nations affects ETS evolution and its functioning as many more nations are planning to implement ETS in the Paris regime. The research agenda on how the climate policy can complement the established institutional structure should be a priority. We suggest that other nations with regulatory traditions and/or regulated electricity sectors should consider the K-ETS as a lesson when implementing a carbon market. Focusing on “how to adapt” to their own institutional environment rather than “how to adopt” the established ETS model should be the goal.

Chapter 6. Contested Net-Zero Target Setting in a Transitioning Country: The Case of South Korea

6.1. Introduction

The global community agreed to limit the increase in the global average temperature to well below 2 °C and pursue efforts to limit the temperature increase to 1.5 °C in the Paris Agreement (2015). The IPCC Special Report on the impacts of global warming of 1.5°C (2018) suggested that net-zero emissions can "halt anthropogenic global warming on multi-decadal time scales" (A.2.2). It also suggested nations to decrease emissions by 45% from 2010 to 2030 to reach net-zero around 2050 to meet the 1.5 °C goal. Net-zero or carbon neutrality is achieved "when anthropogenic CO2 emissions are balanced globally by anthropogenic CO2 removals over a specified period" (IPCC, 2018 p.24).

Net-zero pathways involve mitigation efforts, trading in carbon markets, and the use of removal technologies like Carbon Capture Utilisation and Storage (CCUS) and nature-based solutions (Levin et al., 2020). 74 Parties to the Paris Agreement have either legislated or declared a net-zero emissions target (2021)[11]. Leading economies like the EU, the US, China, and Japan have all declared net-zero in 2020. Due to the COVID-19 pandemic in 2019, some countries aligned their economic and social recovery efforts with climate action to transition to net-zero emissions (Levin et al., 2020). Hepburn et al. (2020) stress that the COVID-19 crisis could give a critical opportunity to trigger dramatic progress in climate action. As a visible example, the European Green Deal was established in 2019: it includes a net-zero target by 2050 for efforts to overcome economic downturn and climate emergency. Despite the global "wave of net-zero" (Höhne et al., 2021) predictions on reaching the Paris goal are sceptical. Many argue that existing pledges and measures are not sufficient to deal with the scope and timing of the climate emergency (Deutch 2020; Geiges et al. 2020; Höhne et al. 2021).

Net-zero target setting demands close examination at the national level. Rogelj et al. (2021) indicate that the "details behind net-zero labels differ enormously", and stress the importance of consistency, clarity, and accuracy in setting the greenhouse gas (GHG)

[11] Climate Watch https://www.climatewatchdata.org/net-zero-tracker Accessed January 24, 2022.

targets under the Paris regime. van Soest et al. (2021) used an Integrated Assessment Model (IAM) to examine the EU and nine other major emitting countries and found that measures such as land use and negative emission technologies determine the prospects for achieving carbon neutrality and emphasised the need for clear definitions and political agreements on such measures. Relying on negative technology and using offsets can aggravate uncertainty around reaching the Paris goals, and net-zero requires a robust framework with social and environmental integrity (Fankhauser et al., 2021).

Setting net-zero target is a political process. Quantifying routes and suggesting mitigation pathways is a political intervention that can limit the spectrum of linked choices (Beck and Mahony, 2017). Political feasibility of net-zero depends on the geographic and socio-economic contexts (Jewell and Cherp, 2020). Millot, Krook-Riekkola, and Maïzi (2020) examined how France and Sweden are transitioning towards carbon neutrality, while they differ in terms of costs and achievability due to different choices made in public policy and energy governance since the 1970s. However, the social, economic, and political context of setting national net-zero targets is not well understood outside the EU.

Bataille (2020) suggested that carbon neutrality should have different implications for developed, transitioning and less developed countries due to their different historical responsibility, resources, and projected growth of energy demand. Deutch (2020) considers that net-zero by 2050 is unlikely for many growing and emerging economies. Yet, there is hardly any literature on how in-transition and developing countries are constructing net-zero and how realistic their plans are for achieving this goal. We seek to address this gap by examining how South Korea (hereafter Korea) set its 2050 carbon neutrality target and finding the role of carbon market in the strategy; and evaluating whether the carbon neutrality agenda is likely to become institutionalised and transform Korea into a low-carbon society.

6.2. Background

Korea is one of the countries that have set a carbon neutrality target by 2050 alongside adopting a Green New Deal in late 2020. The target was legislated in the “Carbon Neutrality and Green Growth law” in 2021. Korea was a developing country in the 1960s, became a member of the OECD in 1996, and officially changed its status to a developed country in the United Nations Conference on Trade and Development (UNCTAD) in July 2021. According to the World Bank, Korea's GDP grew rapidly by an average of 7.3% annually between 1960 and 2020, and its GNI increased from $67 in the early 1950s to over $30,000

per capita in 2020[12]. Korea has an energy-intensive and export-driven economy. Due to its rapid development, its greenhouse gas emissions more than doubled between 1990 and 2013, one of the fastest emissions growth rates of the OECD countries (OECD, 2017). Korea emitted 709.1 MtCO2 of greenhouse gas in 2017 and is the 11th largest emitter globally (The Government of Korea, 2020b). Although its emissions are stabilising, they have not decoupled from the GDP growth yet. The case of Korean climate policy can shed light on the efforts of transitioning countries to mitigate greenhouse gas emissions under the Paris regime, which face tensions between economic growth and greenhouse gas emission mitigation.

Some scholars have examined how Korean climate policy developed in the Kyoto period. Han (2015) suggested that Korea sought to be a pioneer in the global environmental arenas by adopting the Low Carbon Green Growth (LCGG) agenda of President Lee Myung-bak (term 2008-2013). LCGG envisioned a win-win relationship between environmental concerns and economic growth, and Korea positioned itself as a bridge between developing and developed countries. In the Kyoto period, Korea implemented somewhat ambitious climate policies and became the first non-Annex 1 country to adopt mandatory emissions reporting and management followed by the adoption of a national Emissions Trading Scheme (ETS) in 2015. However, the literature has not examined how the country is responding to the climate emergency challenge in the Paris period.

We first examine how Korea came to adopt the 2050 carbon neutrality goal. We then suggest that the carbon neutrality agenda is not likely to lead to institutionalisation: Korea's climate policy is evolving only incrementally because of the lingering political economy of the developmental state and the lack of social buy-in. With the term institutions we refer to formal and informal rules and procedures, routines, norms and conventions (Hall & Taylor, 1996). We employ Historical Institutionalism (HI) (Hall, 1993; Hall & Taylor, 1996; Thelen, 1999) to better understand how Korea adopted the carbon neutrality target and explain how the resistant relationship between government bureaucrats and the energy and key industrial sectors is hindering institutional change. Lockwood et al. (2017) suggest that HI offers insights into issues such as energy transition and can be used as an analytical tool for understanding institutional dynamics of

[12] The World Bank https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=KR Accessed in January 24, 2022.

transformation. Yet, the theoretical framework has seldom been used to examine the evolution of climate policy at a national level.

Historical Institutionalism explains how institutions emerge from and are embedded in concrete temporal processes (Thelen, 1999). It accounts for both stability and change of institutions through "path-dependency". Institutions continue to evolve in ways that are path-dependent, while the continuity is punctuated by "critical junctures" when institutions change significantly, branching out from the historical path to a new one (Collier & Collier, 1991; Hall & Taylor, 1996). The key actors' choices during a critical juncture are consequential, leading to institutional patterns that endure over time (Mahoney, 2001). Therefore, attention is needed to the politics of path-dependency and political conflict of actors when examining institutional change (Peters, 2005). By analysing the political manoeuvring of actors involved in Korea's 2050 net-zero target setting, we investigate whether the net-zero agenda is a choice point or a "cleavage" that triggers a critical juncture for institutional change (Collier & Collier, 1991). We evaluate to what extent the agenda setting momentum is leading to a transformation that dislodges older institutional patterns.

Korea's LCGG initiative of the Lee Myong-bak Administration (term 2008-2013) has been considered "environmental developmentalism" (Kim, 2016), "developmental environmentalism" (Kim and Thurbon, 2015), and "authoritarian environmentalism" (Han, 2015) that reflects the legacy of the developmental state of the 1960s-1970s. Korea achieved remarkable industrial development in the period, and the authoritarian government of President Park Chung-Hee (term 1961-1979) used good economic performance as the primary means for establishing the legitimacy of the regime (Koo, 1987). Developmental State is a model of centralised government in East Asia that manages the market and steers industrialisation through strong state interventions (Johnson, 1987; Woo-Cumings, 1999; Yeung, 2014). Korean development state bureaucrats financed and guided "Chaebols" for export-oriented economic growth from the 1960s. Chaebols are large Korean conglomerates managed by a single family which were key actors in Korea's developmental history (Johnson, 1987). Kim (2016) employed the notion of "path-dependence" to highlight the close ties between the bureaucrats and private sector, which contributed to "environmental developmentalism" during the LCGG initiative. The political economy of climate policy can be seen as a legacy of developmentalism, pursuing "green" as a new growth engine to bolster development supported by high degree of bureaucratic centralisation (Kim, 2016; Kim and Thurbon, 2015; Lee and Yun, 2011; Watson, 2012).

Minns (2001) marked the decline in developmentalism and eroding state autonomy and suggested that the Korean developmental state has become reoriented after democratisation and the financial crisis in the 1980s-1990s. Kalinowski (2021) argued that the Korean path dependency of the developmental state has made a twist to enhanced green industrial policies owing to the international climate change agreements. Our findings corroborate and extend this line of reasoning by demonstrating a distinct path-dependency in Korean climate policy during the Paris period. Path-dependency involves both stability and change of institutions bounded by social and political structures (Thelen, 1999). We evidence both stability and change aspects of the path-dependency. The institutional structure of a strong presidential state model with majoritarian politics enabled to set 2050 net-zero agenda. But the path-dependency to embrace development and limited public engagement persists and restricts transformation. We argue that although the carbon neutrality agenda seems radical, Korean climate policy evolves incrementally despite changed political circumstances and the climate emergency. We also point out that the carbon market was used as a silver bullet to deal with the contradiction between development and mitigation.

6.3. Methods

We used expert interviews and policy documents as key materials to analyse the themes in the discourses of actors involved in the 2050 carbon neutrality target setting. HI considers institutions a legacy of concrete historical processes: institutions emerge and change as a result of historical conflicts and constellations (Thelen, 1999). HI scholars also acknowledge that ideas of agents have explanatory power in relation to institutional change (Hall 1993; Hall 1996). We seek to understand the change and resistance of institutions through the ideas or discourse of actors. A discourse is an “ensemble of ideas, conceptions, and categorisations that are produced, reproduced, and transformed in a particular set of practices and through which meaning is given to physical and social realities” (Hajer, 1995, p. 44). We considered that the discourse of policy actors like the President and government representatives, and their relationships with the industry and civil society can explain how institutions emerge and evolve.

We focused on the 2050 net-zero target setting in the period between 2020-2021. Policy documents were first analysed to identify key actors and their discursive activities. We reviewed more than 130 legal documents, government and national assembly reports, seminar reports, position letters relating to Korean climate policy, such as the Korea Green Deal, Long-term low greenhouse gas Emission Development Strategies (LEDS), and the

2050 Carbon Neutrality Strategy. Grey literature of think-tanks and NGOs and academic literature were also analysed. We observed a public consultation event for the 2050 LEDS held in 17 October 2020[13] and a public hearing expert seminar in 19 November 2020[14]: both events were recorded and made available and accessible to the public via YouTube. The speeches of various stakeholders were transcribed for analysis.

In addition, twenty expert interviews were conducted in Korea between August 2020 and September 2021. The participants were identified as part of the document analysis on the basis of their visibility and influence, and referral sampling was used to identify further participants. Ten face-to-face interviews were conducted in Seoul. Another ten interviews were conducted over video conference calls. The interviewees included experts from the government and public institutes (6), Non-Governmental Organisations (NGOs) and civil society (4), consultancies (4), academia (2), industry (1), Non-Profit Organisations (NPOs) for business and think-tanks (2), and media (1). The interviews were semi-structured with open-ended questions and they lasted 30-60 minutes. Participants were fully informed about the purpose, methods, and possible uses of research, and informed consent was obtained before the interviews. Institutional ethical clearance was obtained before data collection commenced. During the interviews, we ensured that the participants' anonymity and confidentiality were maintained. In the results, we indicate the position and sector of interviewees in quotes; and reveal the position and organisation for policy actor speeches observed from the public events.

6.4. Results

6.4.1. 2050 Carbon Neutrality Agenda Setting

Korea officially ratified the Paris Agreement in 2016, highlighting its role as a leader in climate policy. Korea considered the recommendations of the IPCC special report on 1.5˚C (2018) partly because the report was finalised in Songdo, Korea and a Korean researcher Dr. Lee Heosung became the chair of the IPCC in 2015 (Choi, 2020). Public awareness of climate change has grown as extreme weather has become more severe and frequent. The annual average temperature has increased 1.8˚C, and precipitation risen by 160mm in Korea in the past 100 years (The Government of Korea, 2020b). Fine Particulate Matter (PM) pollution has raised demands for clean air and a safe environment (Chung and Kim

[13] https://www.youtube.com/watch?v=HN1sUU543lU

[14] https://www.youtube.com/watch?v=iR0S7IyG0uM

2018). Health impacts of PM originating from fossil fuels have rapidly become a concern since 2013 (Kang & Kim, 2014). Chung and Kim (2018) consider PM a climate change problem in Korea. As public concern about climate change and air pollution grew, climate policy became an item on the political agenda.

> *Before we had to search for people to make news, we nagged media to write about the issue [Climate Change], we had to appeal to the members of the National Assembly to raise the problem. We had to persuade them to do so. But now we just sit here, and the public sentiment is naturally established. Now I think climate change discourse has gained a significant place. (Representative, NGO)*

President Park Geun-hye (term 2012-2017) of the conservative party was dismissed in March 2017 for misuse of power and taking bribes from large corporations like Samsung and Lotte (Turner et al., 2018). President Moon Jae-in of the democratic party was elected in May 2017 (term 2017-2022). He pushed for a comprehensive plan to address the PM problem, expansion of renewable energy, and the reduction of nuclear energy onto the national priority agenda. Energy Transition was central to the administration (Researcher, Government Institute). The administration updated the 8th National Energy Supply Plan (2017) by repealing the plan to build new nuclear power plants, stopping the life span expansion of existing nuclear plants, and closing of old coal power plants. It sets the goal of increasing renewable energy to 20% of the total by 2030 (MOTIE, 2017). Nuclear energy generation will decrease from 30.3% (2017) to 23.9% (2030), coal power generation decrease from 45.4% (2017) to 36.1% (2030), while renewable energy generation will increase from 6.2% (2017) to 20% (2030).

> *Political leadership is a very big factor [for change]. This is significant in our country. How the president thinks are a very big factor. (Director, Government)*

The Korean Presidency is a single term of five years, while the National Assembly election is held every four years. When President Moon was elected, the National Assembly was balanced at 132 conservatives versus 128 democrats. Political power is shared by the president and the 300 members unicameral multi-party national assembly. The change of the majority party increases uncertainty in the policy agenda (Manyin et al., 2016). The democratic party obtained victory in the National Assembly elections in April 2020, and the left-wing political parties altogether gained more than 180 seats out of 300.

> *This means that they have the power that cannot be against…The filibuster is not possible. We have a system that is made to adjust agenda when there is severe dissonance in the national assembly, but it is no use now. (Director, National Assembly).*

The democratic party had pledged the Green New Deal in the National Assembly election in 2020. Its main agenda for energy and climate change policy was to legislate the 2050 net-zero target, adopt a carbon tax, stop coal financing, and phasing out coal-fired power plants (Korean Democratic Party, 2020). After the election victory, the president pushed the Korean New Deal agenda to lock in their patrician power before the lame-duck, the final period of his office.

> *The lame-duck starts in 2021, and there will be a burden for the president to implement a policy when he loses his momentum…So multiple legislation is in progress, and the policy that needs the National Assembly's support, such as net-zero target, and environmental policies have all started legislation in 2020. (Director, National Assembly)*

Due to the economic downturn during the COVID-19 Pandemic, the role of the state was highlighted in addressing the national crisis. From disease control to economic recovery, the narrative stressed the government's role in finding a solution to the climate crisis (Hepburn et al., 2020). The New Deal was proposed as the solution for economic downturn, and the Green New Deal was included in the package to deal with the climate crisis (Boyle et al., 2021; OECD, 2021). Even before the pandemic, the Green New Deal had become a trend in the West (Boyle et al., 2021; Chung, 2020): the US democratic party had proposed such a deal in 2018, Senator Sanders had proposed a New Deal in his presidential pledge in 2019, and Jeremy Corbyn of the British Labour party pledged to launch a "green industrial revolution". The EU adopted the European Green Deal in 2019.

In the presidential address celebrating the third year of the administration in 10 May 2020, President Moon said that the government would adopt the Korean New Deal to help recover the economy from the COVID-19 crisis. In a meeting two days later, the cabinet members started to discuss incorporating the "Green New Deal" into the agenda. On 15 May, relevant ministries gathered to report to the president on the possibility of implementing the Green New Deal. The government officially presented the plan to adopt the Korean New Deal on 14 July 2020. The Korean New Deal had aimed to overcome the economic downturn by fostering structural transformation through digitalisation and green

economy. The deal of 73.4 trillion KRW is estimated to create 660000 jobs and to transform Korea into a low-carbon economy and society through technological innovation, energy market change, and public participation (The Government of Korea 2020a).

But when the Korean New Deal was published in July 2020, the 2050 carbon neutrality target was not part of it. It only mentioned that Korea will "strive for a net-zero goal" through the Green New Deal without a set timeline or detailed pathway. The statement was criticised because of its hesitance to declare an explicit net-zero target as the IPCC suggests. This is because the LEDS was to be submitted to UNFCCC by end of 2020, and the 2050 target and strategy were not yet agreed upon, and the mitigation pathway scenarios were still undergoing consultations and debates (Yun, 2021).

6.4.2. Contested Carbon Neutrality

The draft scenarios for the 2050 target and associated mitigation pathways were developed by the National Research Council in 2020. After consultations with 100 experts from research, civil society, industry, and youth groups between March 2019 and February 2020, five pathway scenarios were suggested (Lee, Shim, and Oh, 2020). The scenarios ranged from the most ambitious 75% emission reduction compared to the 2017 levels, reaching 179 MtCO2, to the least ambitious 40% reduction scenario reaching 426 MtCO2 by 2050. The first scenario incorporated foreseeable social and technical innovation, and the fifth scenario was not considered to be compatible with the goal of limiting global warming of 2˚C (Lee, Shim, and Oh, 2020). A more ambitious net-zero scenario was also discussed in expert consultations, but it was considered too expensive and uncertain as a national target. The research concluded in July 2020 that the discussion on radical transformation should be continued and expanded (Lee, Shim, and Oh, 2020).

Before submitting the LEDS to the UNFCCC in 2020, the government established the "2050 LEDS Forum" of 69 experts representing power generation, industry, transport, building, and NGOs and youth groups to discuss the 2050 target and its vision again (The Government of Korea, 2020b). The forum was advised by 22 government divisions and relevant government research institutes. The government announced that it consulted experts five times during July 2020 for the strategy. In addition, an online survey was conducted with over 3000 members of the general public during June-July 2020. The majority of them (58.9%) viewed that economic and social impacts should be considered in the setting the 2050 goals (The Government of Korea, 2020b).

> *Net-zero was discussed as NGOs have requested during LEDS discussions. Experts in the Korea Environment Institute, which advises Ministry of Environment, said it is possible. It is hard for me to conclude as I have not researched, but I see that net-zero is not possible by 2050. (Professor, Academia)*

The Ministry of Environment organised a public online consultation on 17 October 2020 with about 300 participants. Experts from power sector, industry, transportation, building, waste, agriculture, and carbon sinks presented the draft government strategy for the 2050 pathway, followed by an expert panel discussion and questions from the audience. While the Korean Environment Institute (KEI) expert explained that it is possible and feasible to reach a net-zero target by 2050 through energy transformation, the Korean Energy Economy Institute (KEEI), the national institute that supports MOTIE, asserted that carbon neutrality is infeasible and un-realistic for the Korean power sector.

> *According to our analysis, we need 335GW of [electricity] facility capacity in 2050 even when we reduce our electricity demand at the maximum. In order to build 335GW capacity, we need to consume a vast area of our land [for solar panels]. According to our analysis, this area amounts to about seven times large as city of Seoul...We estimate that we need to spend 300 trillion won by 2050. For transmission and distribution, we need ten times much investment compared to now. This will lead to raise in electricity price. (Senior Researcher, KEEI)*

The 2050 net-zero target was also contested by the manufacturing industries. A researcher from the Korea Institute for Industrial Economics and Trade (KIET), another national institute that advises MOTIE, claimed that the energy efficiency of Korean industry is already at the highest global standard; thus, raising the ambition for emission reduction is too costly.

> *Korea's manufacture industry is the 5th or the 6th largest in the world. It has one of the strongest industry sectors if we consider the size and geography. We need to consider this fact. Also, we need to consider that we export more than 60% of our products…The reason we have large industry emissions is due to this industrial structure. (Director, KIET)*

A youth group representative asserted that the government and the energy and industry sectors are complacent, and the voice of public was not incorporated into the national strategy setting for 2050.

> *However, I attended the pre-session meeting of presenters and discussants and heard that net-zero target is not agreed among the government, so it is a taboo word. The reason was that the MOTIE and the Ministry of Strategy and Finance (MOSF) don't agree with the net-zero target. (Researcher, NGO)*

The government held two public events during October and November of 2020 on LEDS, but they were considered as expert presentations rather than public participation events.

> *After the public consultation in mid-October, there will be a public hearing in November. I wonder if this short period provides sufficient time for deliberation. I wonder if the public watching this internet video for 5 hours have fully expressed their opinions. We need to look back on the LEDS governance process, and the future plans should systemically provide the social consensus process for a just transition. (Researcher, NGO)*

Although the LEDS forum reported that 81% of the 300 participants agreed on the 2050 net-zero target (The Government of Korea, 2020b), many interviewees mentioned that the general public might have different views. The NGO representatives and civil society participated in the debate, but it is unclear whether their views represent those of the general public. Koreans are aware of the dangers of climate change, but they do not consider it their immediate problem, so are not willing to shoulder the burden of climate action. Tsai (2016) highlights that Koreans take low energy tariff for granted and are not willing to pay more for energy transition.

The Presidential Committee on 2050 Carbon Neutrality (2021) conducted four surveys to the public who participated in the carbon neutrality setting civil meetings for education and consultations[15]. In the final survey that was conducted in 11-12 September 2021, 94.3% of 459 respondents answered that Korea needs to reach net-zero by 2050. However, 45.8% of the respondents indicated that they could bear the pathway to the point where it doesn't harm their life quality (Committee on 2050 Carbon Neutrality, 2021, p.16). The results

[15] https://www.2050cnc.go.kr/flexer/view/BOARD_ATTACH?storageNo=161

showed that 74.7% of the respondents were willing to pay more for energy, however, the majority of them were willing to pay less than 5000 KRW (approximately $4) per month (Committee on 2050 Carbon Neutrality, 2021, p.23).

> *There are industry's opinions, but that is not the only problem. It is a political problem… The general public is like that. Nobody likes raising the electricity price. They [the government] cannot persuade the public for that… As I see it, the public takes climate change seriously but they don't think it is their own problem, but they think the government should solve it. (Professor 2, Academia)*

> *When we do the public survey, they say we need to stop climate crisis. But when asked to pay more for energy, they don't. That is difficult. LEDS lacks this fundamental discussion. (Senior Researcher, Government Institute)*

The public consultation indicates how the presidential agenda is contested by the MOTIE and relevant energy and industry institutes. It also showed that the strategy did not canvass and incorporate public opinion. Still, the Moon administration suggested the carbon neutrality target giving more power to the MOE, while a struggle persisted between the MOE and the MOTIE.

> *It is significantly different when the MOTIE is in the lead and when the MOE is in the lead amongst the government. Especially now the civil society has gained power. (Director, Industry)*

The carbon neutrality target and the 2050 pathway were adopted under strong presidential leadership with a supporting network of government (MOE) and affiliated experts from the national institutes and environmental NGOs that gained power after President Moon took his office (Researcher, Government Institute). Meanwhile, NGOs and civil society made policy proposals to the political parties of the National Assembly, held joint seminars on net-zero with assembly members of the democratic party which supported the agenda. They also undertook public campaigns and conducted surveys to educate the public about the climate emergency through press and media (Expert, NGO).

> *The major political party has will. The Democratic party is pushing hard, and the bureaucrats [MOTIE] are resisting. But it's democratic society and they should take it when the National Assembly legislates [net-zero target]. (Expert, NGO)*

A window of opportunity opened when other countries started to adopt net-zero targets in 2020. The Korean political agenda is influenced by its strategic and economic partners like the US (Manyin et al., 2016), and it competes with neighbouring countries like Japan and China (Hahm & Heo, 2019). The industry also became more accepting of the transitioning to a low carbon economy as the international atmosphere changed (Professor1, Academia).

> *The window of opportunity depends on external factors. Because our industrial competitiveness will be affected when we do not respond to international change. I think RE 100 and the thought that renewable energy use could be a hindrance for trade, the fact that there is such movement in Europe should have affected our industries. The industry sector must have discussed the need to respond to the pressure. (Director, National Assembly)*

After the EU and the UK adopted 2050 net-zero targets (2019), the deadline approached to submit NDCs and LEDS to the UNFCCC at the end of 2020. Asian countries like China declared a net-zero target by 2060 in September 2020, followed by Japan setting net-zero target by 2050 in October 2020. Biden was elected as the new president of the United States in November 2020 and pledged to re-join the Paris Agreement with an ambition to reach net-zero by 2050.

> *We are not alone in this action. China, Japan, the US, and the EU all did it. Maybe the economic scale of the countries that declared net-zero should be around 80% globally. So, this is the flow. It has become a flow. (Director, Government)*

The LEDS forum outcome of a net-zero target by 2050 was submitted for approval by the Green Growth Committee and the Cabinet Council. Then, the carbon neutrality target was declared on 28 October 2020 in a presidential address, and multi-ministerial meetings were held to confirm the details of the net-zero pathway. The Prime Minister presented the national strategy for reaching carbon neutrality on 7 December. The revised NDC and LEDS with 2050 net-zero target were submitted to the UNFCCC on 30 December 2020. The 2050 Korea vision statement in the national strategy reflects the relationship between net-zero declaration and the Korean New Deal.

> *The Republic of Korea moves towards the goal of carbon neutrality by 2050. The Korean New Deal will serve as a stepping-stone to reach carbon*

> *neutrality by 2050... Korea will lead by example to help the international community jointly make efforts to reach carbon neutrality by 2050. (The Government of Korea 2020b, p.46)*

The Korean Green New Deal showcases Korea as a responsible co-solver of the climate crisis and emphasises its international leadership (Lee and Woo, 2020). To lock-in the net-zero target, the "Law on Carbon Neutrality and Green Growth to Respond to Climate Crisis" was legislated on 24 September 2021, making Korea the 14th nation to legislate a carbon neutrality agenda. The Korean net-zero declaration shows how the president and central government continue to be the dominant forces in South Korean policy making. The presidential and majoritarian political structure, supported by strong central government enabled the swift adoption of the Green New Deal and carbon neutrality agenda when the external environment changed. In the next section, we explain why the carbon neutrality is not socially agreed to shed light on to what extent it is institutionalised.

6.4.3. Resisting Power of the Bureaucrats – Legacy of the Developmental State

Historical Institutionalism helps understand the change and stability in Korean climate policy and related institutions. We demonstrated that the 2050 carbon neutrality target was possible due to the institutional setting around the strong state, where the president and the government set the agenda. However, path dependency also hinders transformative change in climate change policy. Even when a new president assumes power over the agenda setting, a strong relationship persists between government bureaucrats (MOTIE) and the energy and industrial sectors resisting change. The lingering ties and their power stem from the developmental state.

Korea has a strong central state supported by an efficient bureaucracy (Kwon & Yi, 2009). A merit-based bureaucratic system has existed for over 600 years, with a long Confucian influence. The efficiency of the bureaucracy stems from its openness to all social classes (Kwon & Yi, 2009). Success in examinations has been the only criterion for becoming a government official, and the best young talent is recruited. The government bureaucrats spearheaded industrialisation since the 1960s with a high degree of efficiency and discipline, and the legacy of the developmental state persists (Koo, 1987). Kim and Han (2015) consider Korean bureaucracy to have institutional autonomy, and civil servants have high social status: the society considers them a solution to problems.

> *It is big government. Koreans still demand active government interventions. The government spending is still significantly high portion*

> *of GDP. When you think about this the public demands more proactive role from the government. (Director, National Assembly)*

The persistent power of the bureaucracy means that stronger ministries can dictate the rules of the game to protect their interests. This causes conflicts between government ministries when a new institutional agenda emerges, particularly when the president changes. Park and Joo (2010) explain that Korean civil servants usually work in one ministry until retirement, and seniority is the only factor for promotion, leading to collectivism and a tendency to not cooperate with other ministerial organisations. For instance, the MOTIE and the MOE often have conflicts over economic growth and environmental concerns in the climate policy agenda.

Industry interests and competitiveness are important concerns. A strong relationship persists between government bureaucrats and industry, as economic development has been based on state financing of large corporations known as Chaebols. After the Korean War (1950), the government promoted rapid industrialisation through planning and establishment of heavy industries dependent on export. The large Chaebols have become international brands such as Samsung, Hyundai, and LG. The Korean government still supports the industry, when its annual economic growth rate is high 5% and manufacturing accounts for 39% of the GDP (The Government of Korea, 2020b).

The Korean industry includes energy intensive manufacturing of steel, petrochemicals, auto mobiles, and semi-conductors. Korea imports 94% of its energy (2017) as it does not have its own energy resources. Energy security is a high concern as the nation is isolated from the continent's power grid due to military confrontation with North Korea (Chung and Kim, 2018). Since 1961, the electricity company Korea Electric Power Corporation (KEPCO) has been state-owned, and the electricity tariffs and investment planning has been under government control (Lee and Ahn, 2006). The government plays a critical role in economic planning and energy supply. KEPCO was partially privatized by reforms, however the government still holds over half of the equity. The MOTIE guarantees stable energy supply to the industry from coal (43.1%) and nuclear (26.8%) energy sources (The Government of Korea, 2020b).

> *The MOTIE is in charge of energy security, because Korea had to fully depend on energy imports…Now after the industrial development, we still have manufacturing sectors like semi-conductors at the centre of the industrial structure. These industries have to bear great amount of loss*

> *when the energy supply is stopped, so stable energy supply is one of the biggest challenges we cannot give up. (Director, National Assembly)*

The Moon administration has chosen energy transition to renewable sources as a strategy for the net-zero pathway. However, the expansion of renewable energy has been challenging due to the close relationship between government bureaucrats (MOTIE) and the industry. The contestation over renewable energy expansion is about its costs and the argument that it cannot guarantee a stable energy supply, which is crucial for the national economy.

One of the actors implicated the relationship between the MOTIE and the energy sector as the "Energy Mafia" (Director, Consultancy). Korea attempted energy transformation through liberalisation in the late 1990s after the Asian economic crisis during President Kim Dae-joong's presidency (term 1998-2003). However, the reform failed after a political struggle between politicians who insisted on the reform and the bureaucratic power stemming from the tight relationship between the MOTIE and the energy sector (Tsai, 2016). The Korean power market is still monopolised by KEPCO, which subsidises electric companies to generate, transmit and distribute energy for the nation.

> *KEPCO and Korea Power Exchange (KPX), they are all related to the MOTIE, and they are the MOTIE Mafia or Energy mafia…These amazingly powerful people. It's been over 30 years, and this field is in their palms. (Director, Consultancy)*

Despite strong resistance by bureaucrats and the energy and industry sectors, the Moon administration declared the 2050 net-zero target when the window of opportunity opened. The Korean carbon neutrality target indicates how the president and the majority party can exercise power over decision making. However, the government is not free from rigid incumbent energy structure and institutions. Korea still faces a long-term challenge of transitioning to a low carbon society. Despite the Moon administration attempts to reduce coal and nuclear power generation and replace them with renewable energy, progress remains slow and incremental.

> *I am very sorry to say this, but there are only words, and we are not touching the real challenge. It is only a feast of words. (Senior Researcher, Government Institute)*

The National Energy Plan (2019) includes plans to reduce nuclear and coal power plants by not building new plants and closing the oldest ones. The 9th National Energy Supply Plan (2020) indicates that nuclear and coal energy will decline to 25% and 19.9% of national energy supply, while renewable energy increases to 20.8% in 2030. According to the publication of the NDC (2020), Korea has updated the 2030 target to reduce emissions by 24.4% compared to 2017 levels of 709.1 MtCO2. The expected emissions in 2030 are predicted to be 536 MtCO2, and their attainment requires international carbon market and forestry offsets of 38.7 MtCO2. Next, we explain how the Korean climate policy and carbon neutral pathway were compromised due to resistance by bureaucrats and industry actors.

6.4.4. Silver Bullets of Carbon Market and Technology to Solve Over-ambition

Korea has used carbon markets as a silver bullet and hopes that technology such as CCUS will aid emission reduction. Korea planned to use the carbon market to achieve a 30% reduction compared to BAU to reach 543MtCO2 in 2020 under the LCGG agenda (2009). It implemented a national ETS to balance the conflict between industrial growth and greenhouse gas mitigation.

Korea continues to favour market mechanism in the Paris period. In June 2015, President Park Guen-hye (term 2013-2017) planned to visit the US to meet President Obama before the COP21, and the agenda included climate action. The end of June was the deadline to submit INDCs. Then the Korean government had a challenge in setting the 2030 target due to conflicts between the MOTIE and energy and industry sectors coalition on one hand, and the MOE-civil society coalition on the other hand. The Obama administration increased pressure to raise ambition, followed by the British government and the EU delegation claiming Korea's 2030 ambition to be too low (Choi, 2020). To solve the conflict between industry and civil society, the Korean government used the international carbon market for a compromise. Korea set the target to reduce 37.4% compared to BAU to reach 534 MtCO2 by 2030 in the INDC (2015) (Choi, 2020). However, the market mechanism was to deliver 11.3% of this, and domestic mitigation 25.7%, just marginally more than the previous 2020 goal.

After President Moon took office in 2017, the government updated the mitigation roadmap and the INDC target in 2018. However, instead of establishing a new mitigation roadmap, the government made incremental steps to reduce the role of international credits in achieving the same target and raising the portion of domestic reduction from 25.7% to 32.5% for achieving the goal (MOE, 2018). The government did not revise the 2030 target

of 37% reduction compared to BAU. The remaining 4.5%, which amounts to 38.3 MtCO2 was expected to be reduced through international carbon markets and forest offsets. Civil societies asserted that the government should not rely on international carbon markets and should abandon the BAU target setting. Eight NGOs argued that without international carbon markets and offsets, the 2030 domestic mitigation target to reach 623MtCO2 is higher than the 2020 target to reach 543MtCO2, evidencing inconsistency creating international mistrust (Civil Society, 2018).

Korea is a strong advocate of Article 6 of the Paris Agreement on market mechanisms (Choi, 2020), and added removal technology as solution to achieve an ambitious net-zero target. The updated 2030 mitigation goal in the NDC (2020) was to reduce 24.4% compared to 2017 levels (amounting to 26.3% reduction compared to 2018). To reach the goal, 48.6 MtCO2 is offset through international carbon markets, forestry offsets and technologies like CCUS. Yet, civil society and international organisations have anticipated that Korea's 2030 target will not enable net-zero emissions by 2050 (Eom et al., 2021). Min (2021) argues that Korea should reduce emissions by at least 50% compared to 2017 levels by 2030 to reach carbon neutrality by the mid-century. Fuentes Hutfilter et al. (2020) also considered that Korea should reduce emissions by 59% in 2030 compared to 2017 levels to reach the Paris ambition. On a global scale, Geiges et al. (2020) found that incremental improvements in reduction targets are not sufficient to achieve 1.5˚C limit, which requires halving 2030 emissions from the current NDCs.

After the carbon neutrality target declaration in October 2020, the government established a multi-divisional task force to revise its 2030 target and adopted the goal of "at least 35% reduction compared to 2018 levels" in the Carbon Neutrality and Green Growth Law legislated in September 2021. At the same time, the Presidential Committee on 2050 Carbon Neutrality was established to discuss renewed 2050 mitigation pathway with enhanced expert discussions and public participation (The Presidential Committee on Carbon Neutrality of Korea, 2021).

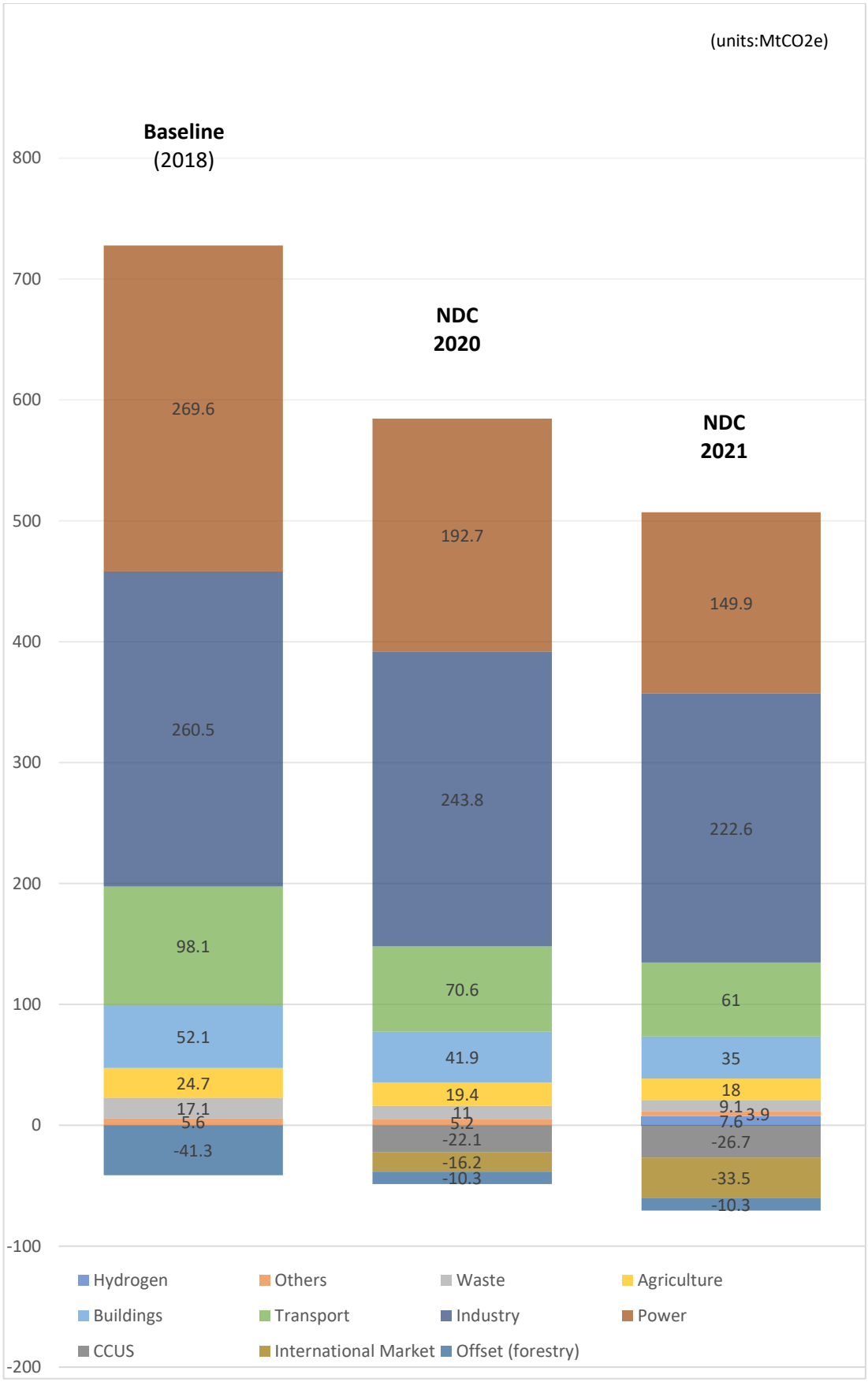

Figure 6.1. South Korea's 2030 mitigation target after research of the Presidential Committee on 2050 Carbon Neutrality (The Presidential Committee on Carbon Neutrality of Korea, 2021)

Achieving net-zero requires immediate and massive technological and social changes, including clean energy, offsets, and removal technologies (IEA, 2021). However, Korea has only made incremental changes in raising its climate ambition. We conclude that it has not deviated from the path-dependency of developmental state, as it tries to find ways to mitigate greenhouse gas without systemic changes in the incumbent energy and industry structure. Korea is not abandoning its energy intensive industrial structure to maintain its economic stability, nor engaging in the transformation of the energy system. For instance, the update of the 2030 target in the NDC 2021 illustrates a limited increase in ambition for the power and industry sectors, while the market mechanism and technology use are intensified. The Presidential Committee on 2050 Carbon Neutrality (2021) reported an update of the 2030 target in the NDC 2021: increasing the use of international carbon markets from 16.5 MtCO2 to 33.5 MtCO2; increasing the use of CCUS technology from 22.1 MtCO2 to 26.7 MtCO2; and introducing the use of forestry offsets of 7.6 MtCO2 (Figure 6.1.).

6.5. Discussion and Conclusion

South Korea's climate policy is evolving in a path-dependent way without radical energy or industrial transformation. When the window of opportunity opened for the setting of the 2050 carbon neutrality target, the mitigation pathway changed only incrementally due to Korea's political economy and lack of social acceptance. We found that the strong government and the relationship between bureaucrats and energy and industry sectors lingers from the time of the developmental state, hindering the transition to a low-carbon society. As strong incumbent policy networks prevail, Korea is unlikely to quickly transform its economic structure of high energy intensity and export-oriented industry.

Some have discovered the relationship between party politics and climate policy, shedding light on how public opinion, interest groups, parties' nature and system shape policy preferences (Carter & Little, 2021; Ladrech & Little, 2019). The South Korean case adds to explain that institutional contexts such as the electoral cycle affects the climate policy agenda setting, and that domestic institutions and energy economic situations also matter in climate policy (Fankhauser et al., 2015; Schulze, 2021). Our findings corroborate that climate policy adoption is a partisan issue, and the left-wing government was sufficient to result in an ambitious policy adoption (Fankhauser et al., 2015; Tobin, 2017). On the other hand, it also demonstrated how the agenda is not leading to institutionalisation with low social acceptance regardless of the ruling party.

Korean conservative and democratic parties have made climate policy a priority and used the market mechanism to solve the conflict between the economic growth and greenhouse gas reduction. For instance, the Lee administration (term 2008-2013) adopted LCGG agenda (2009) and used an ETS as a tool to mitigate domestic emissions. President Lee intended to boost the economy after the financial crisis of 2008 while addressing international pressure for climate action (Heo, 2015). Climate policy was adopted when the strong presidential drive was supported by the conservative party that had a slight majority of seats in the National Assembly.

The Moon administration (2017-2022) and the democratic party put carbon neutrality target on the national agenda to deal with the economic recovery from the COVID-19 pandemic and to address the Paris Agreement. Adoption of the 2050 net-zero target, just like that of the past LCGG agenda, was based on majority partisan politics. The resemblance raises the question of whether Korean climate policy has changed radically to combat climate change between the two periods. The pressure and urgency have increased, but economic recovery still informs climate policy adoption (Lee and Woo, 2020). We found that government bureaucrats and energy and industry sectors are still holding onto the past narratives of development, and the carbon market and technology continue to be the silver bullets helping to avoid the transformation of institutional structure and the energy system.

The case study also highlights how the net-zero target setting was political, manifesting long-held preference to follow partisan interests without genuine policy discussion. The adoption of the Green New Deal and the carbon neutrality target in 2020 was a political over-promise of the Moon administration to sustain the discursive power of the Democrats and to lock in their values before the lame-duck. The 2050 carbon neutrality target was easy to declare because it is distant in time (Representative, NGO), but the mitigation pathway and the Green New Deal lacked details when adopted, so are unconvincing of their achievability (Director, NGO). Scholars have stressed the need to strategise a long-term low carbon pathway because of lock-in of the path-dependent energy systems (Sachs, Schmidt-Traub, and Williams, 2016; Unruh, 2000; Riahi et al., 2015). The Korean Green Deal and its carbon neutrality target do not lead to a low carbon pathway without discussion on the transformation of the energy system and industrial structure (Representative, NGO).

> *200 million tons, 250 million tons, net-zero target should all be challenging. They are not significantly different. Our country is too buried*

> *in the target. The target has to be ambitious anyway. The important thing is how to get there. How we mitigate 200 or 100 million tons. We need a strategy, a system, a pathway for the change. (Senior Researcher, Government Institute)*

The transformation to a carbon neutral society does not happen if the public is not willing to make a trade-off between economic growth and the environment (Chung and Kim, 2018; Delivering Net Zero, 2021). Public participation in Korean climate policy has improved only incrementally from the Kyoto to the Paris period. Previous studies on LCGG found that there was a lack of deliberative policy process with strong government drive to not incorporate public opinion in the setting of the 2020 greenhouse gas ambition (Han, 2015; Heo, 2015; Kim, 2016; Lee and Yun, 2011). Korean civil society has since the democratisation in the 1980s started to affect environmental policy making (Heo, 2013), however it has not become institutionalised up to the Lee Administration.

Our case demonstrated that the tendency continued when the president and the majority party changed. Although there had been attempts to incorporate NGO and civil society voices under President Moon, it is uncertain whether they fully reflect the views of the general public, and public participation remains limited. Some NGOs and civil society leaders have gained power, but it does not translate into public deliberation and legitimisation. Chung and Kim (2018) consider that Korea has had weak deliberative democratic processes for determining future energy pathways during President Moon's tenancy.

> *After the Moon government, how may I say, we [civil society] lost initiative to the government. We [civil society] lost the drive because we think "now it's the democratic party ruling, so of course they would do their job right". However, in fact, nothing actually changed after President Moon took office. (Director, NGO)*

Even with the 2050 carbon neutrality declaration, Korean climate policy remains prone to political swings. It is uncertain how and when the policy might change in the future. There is "uncertainty of the policy: when the administration changes, it abruptly changes from no to yes" (Professor, Academia). After the change of President to conservative Yoon Suk-Yeol in 2022, nuclear energy is framed as climate friendly energy and its use became the core strategy to reach carbon neutrality. The core plan of the new government is to "expand nuclear energy and its harmonisation with renewable energy to achieve reasonable

mitigation through a balanced energy mix" (National Strategy for Carbon Neutrality and Green Growth, 2022[16]). The plan also includes developing technologies to promote nuclear power through Small Module Reactors (SMRs). It demonstrates how the party competition and parties' pre-existing preferences shape and change climate policy (Ladrech & Little, 2019).

Previous studies have documented the polarisation of policy actors and their political conflicts in the nuclear power policy in Korea (Park, 2019; Nam et al., 2022). The pro-nuclear coalition hangs on to the economic development and energy security narratives that are passed on from the developmental state (Valentine & Sovacool, 2010; Lee, 2021). The new conservative president and his party kept their policy preference to protect interests of the power and industry sectors stressing energy security and economic development. In this light, we suggest future research to track how the Korean carbon neutrality agenda changes under the change of government and the party politics to understand the dynamic process of institutionalisation.

Fankhauser et al. (2021) have suggested attributes for a net-zero framework in climate action. Our analysis finds that Korea's net-zero target setting did not robustly align with the suggested attributes: front-loaded reduction; comprehensive reduction with societal support; cautious use of CO2 removal; and effective regulation of carbon offsets. We highlighted the social and political dimensions of net-zero setting and explained how they likely mean a slow incremental change with low social acceptance and reasoned why the agenda had to rely on carbon markets and removal technology as a compromise.

Examining the agenda setting moment is important given the urgency of climate emergency, which is the core of the net-zero goals. The moment characterised by contingency is the key element of the critical juncture that may have an important impact that endures over time (Mahoney, 2001; Capoccia & Kelemen, 2007). Yet, we conclude that the Korean 2050 net-zero agenda setting process was not leading to a critical juncture to foster a substantial change in institutions that would produce distinct trajectories into low carbon transformation. Cumings (1987) considers that Korea exhibits a "history of economic dynamism mixed with spasmodic social reaction" (p.38). Korea has a history of strong social movements and rebellion at times of regime change through the process of

[16] https://www.korea.kr/news/pressReleaseView.do?newsId=156532835

democratisation, which coincided with industrialisation. Yet, the climate emergency has not sparked genuine social reaction that is needed for institutionalisation.

To conclude, even though South Korea set the carbon neutrality target under the pressure of climate emergency and changes in political circumstances, the legacy of the developmental state engrained in the political economy hinders transformation towards a low carbon society. The path dependency of the strong state is demonstrated by the political leadership of the president, and we have explained how the incumbent policy network of government bureaucrats and energy and industry sectors resisted transformation. The case also demonstrated that the carbon neutrality agenda has low social legitimacy and is prone to political swings. We highlight that the politics of path-dependency involves both stability and change through the interaction between the institutional structure and policy actors. The incumbent energy structure is maintained owing to the actors that still embrace development, while change is attempted by other actors within the institutional structure.

We suggest caution with national net-zero target declarations under the Paris framework, as they can amount to mere local political posturing rather than genuine institutionalisation for the transition towards a low-carbon society. This is particularly relevant in countries that are in transition or still developing, as they face the tensions between ambitious climate action and economic development priorities. Future research is needed to find out how carbon neutrality goals and climate policy can become socially legitimate, to overcome conflicts with the incumbent energy policy networks, and to become institutionalised for transformation towards a low carbon economy and society.

Chapter 7. Discussion and Conclusion

This Chapter summarised how the research questions were answered in the thesis (Section 7.1) and explained how the outcome of the findings contributed to the empirical knowledge, theories, and geographical focus (Section 7.2). I discussed the limitations of the study in Section 7.3 and suggested policy implications and directions for future studies in Section 7.4 and Section 7.5. Finally, the Chapter concludes the thesis in Section 7.6.

7.1. How the Research Questions were Answered

7.1.1. Institutional change of climate policy and carbon markets in the Paris-era

RQ1. How did institutions change in the global climate policy arena from the Kyoto to the Paris period? How is the institutional change reflected in the global carbon markets and their linking?

I analysed how the institutions of global climate policy evolved from the Kyoto period to the Paris period. I employed Discursive Institutionalism to examine the change in the broader global climate policy and carbon markets. Institutions evolved between the two periods through the change of actors, discourse, and their ideational powers. I adopted the concept of "ideational power" to explain how discourse demonstrates powers. Then I observed how the change is reflected in carbon markets. There was the emergence of new actors around the discourse of climate emergency in the Paris-era. However, the institutions changed only incrementally due to collision with discursive power on maintaining economic competitiveness, the discourse and power that lingered from the Kyoto period. The rules of the game were hybridised with the old rules, not fully aligning with the new climate emergency discourse. Although contested, carbon markets remain in the Paris period as a compromise between the discursive power crash of climate emergency and keeping economic competitiveness. The broader social and political context of protectionism led to carbon markets to being fragmented.

As the Paris Agreement urges for a radical and fundamental change in the rules of the game, I investigated how the institutions have changed from the Kyoto-era. However, I found that the institutions only changed slowly and incrementally during the period, highlighting the gap between what is called to be done and what is institutionalised in practice. In the thesis, I explained why the change is incremental, highlighting the crash of the discursive powers. The evolution of carbon markets also reflected the discrepancy

between what was expected in the past and how it developed over time. The carbon markets were incepted with hopes to link them globally, however, linking was limited in practice with a marginal role in climate action. Carbon markets were contested by the climate emergency discourse in the Paris period, but they survived owing to its economic efficiency debates and evolved to have a different focus to create polycentric mini-lateral links. I discovered the unchanging institutional power hindering radical change in climate policy and carbon markets despite the Paris Agreement. Climate policy can change only under a broader political and economic context. In particular, institutional power is demonstrated as the "power in ideas" (Carstensen & Schmidt, 2016) as broader institutional contexts like the economic crisis and protectionism.

7.1.2. Institutional Complementarity of the EU ETS and the K-ETS

RQ2. How did K-ETS institutions evolve differently from the EU ETS and what are the reasons for the divergence? What does that imply to reach the Paris goals?

The global carbon markets grew heterogeneous and fragmented, and the thesis explored how and why the characters and designs of ETSs diverged in different jurisdictions. As nations have their own policy styles and institutions, I explored how climate policies evolved in complementarity to their established institutions. In particular, I compared the K-ETS to the EU ETS to investigate how different institutional arrangements such as political structure and energy liberalisation affected the divergent evolution of the two systems. The EU ETS is a market with stronger legitimacy to stakeholders with stability and certainty in the change of rules, which complements its consensus political structure and liberalised energy market. On the other hand, K-ETS adapted to become more like a regulatory system to be compatible with its strong state model with majoritarian politics and the regulated energy sector. The government still regulates the energy sector due to energy security concerns, and the energy-intense and export-driven industrial development was prioritised.

The EU ETS and the K-ETS evolved differently due to their own established institutional architectures which involved the political process and structure, and how the energy sector is managed from the past. EU ETS grew *complementary* to its decentralised and neo-liberal institutions, while K-ETS adapted to be *compatible* with its strong state majoritarian institutions and has a challenge to build *policy coherence,* especially with the government regulated electricity sector. The ETS design features like allocation adjustment, auctioning and trading, market stability reserve, and flexibility mechanisms diverged due to different

incumbent structures, and the ETS design was largely dependent on the degree of energy and financial liberalisation. Policy styles and institutional complementarity should be taken into consideration when adopting national or jurisdictional ETS under the Paris regime as they affect the functioning and legitimacy of carbon markets.

7.1.3. The politics of 2050 carbon neutrality setting in South Korea

How did South Korea set the 2050 carbon neutrality target? What is the role of the carbon market in the carbon neutrality strategy? To what extent is the carbon neutrality agenda likely to institutionalise transforming Korea into a low-carbon society?

I investigated how South Korea set the 2050 carbon neutrality target and Long-Term Low greenhouse gas Emission Development Strategy (LEDS) in 2020 as a transitioning country, focusing on its political process of agenda setting. I explained how the political process of majoritarian politics enabled the net-zero target and strategy setting. However, scoping with the historical institutionalist lens, I found the path-dependency from the developmental state which resisted change. There was a persistent strong relationship between government bureaucrats and the energy and industry sectors that resisted the transformation of institutions, and social legitimacy for change was low. Based on these observations, I evaluated to what extent the country is likely to transform into a low carbon society as the Paris Agreement demands.

In the case of South Korea, the ambitious 2050 carbon neutrality target setting was possible due to change of the president and his supporting majoritarian partisan power in the year 2020. However, the target and LEDS setting lacked social acceptance. Although new actors attempted reforms after President Moon Jae-in took office (term 2017-2022), the tight relationship between the government ministry and industry sectors sustained to hinder the transformation of the incumbent national energy and industrial structure. The political economy was established due to the government-led economic development in the 1960-1970s to foster energy-intensive and export-driven economy as a developmental state. The government continues to use the carbon market as a silver bullet to achieve the ambitious goal in the Paris-era. Due to the persisting political economy and low social acceptance to transform the national energy sector, South Korea undermines its transitioning into a carbon neutral society in the long-term. The Paris regime requires building governance to review and monitor the net-zero strategy and implementation in the developing or transitioning countries, as the pledge may only be a political declaration under domestic political streams.

7.2. Contribution of the Thesis

7.2.1. Empirical Contribution

Incremental Change of Climate Policy and Carbon Markets

Many have analysed the slow and incremental change of global climate policy (Knaggård, 2014; Munck af Rosenschöld et al., 2014). The Paris Agreement may not be a critical juncture to radically change institutions. Rather, the Paris Agreement reflects the reality of global climate negotiations (Falkner, 2016c). After failing to agree on binding climate action at the Copenhagen conference (2009), a loosely connected regime complex emerged due to the distribution of interests and uncertainty (Keohane & Victor, 2011). Green et al. (2014) asserted that the Paris architecture requires an incremental approach with a balance of top-down and bottom-up measures, and the gradual linking of polycentric climate initiatives.

However, the incremental change in climate actions could be problematic. For example, Coglianese (2008) warned that incremental and piecemeal approaches to climate change may have no effects or bring other side effects. Geiges et al. (2020) found that incremental improvements in global NDCs and 2030 reduction targets are not sufficient to limit global warming. Hence, Kulovesi & Oberthür (2020) found that the 2030 climate and energy policy framework of the EU indicates incremental transition rather than the radical transformation required under the Paris regime. These findings urge for significant strengthening of the climate targets and to ensure the governance system that regularly reviews and strengthens the measures.

In the thesis, I explored how and why the climate policy changed incrementally through empirical cases. I contributed to give reasons for the incremental change in institutions from the angles of actors and their discourses. I found that the evolution of carbon markets also reflected the incremental development of climate policy between the Kyoto and Paris periods. A globally linked carbon market was envisioned in the Kyoto times as a top-down comprehensive way to deal with climate change. However, due to the failure of carbon markets and their linking practice, they evolved to diffuse and diverge heterogeneously owing to national interests and domestic politics (Gulbrandsen et al., 2019; Wettestad & Gulbrandsen, 2019). Carbon markets became fragmented, and the broader institutional context of protectionism also contributes to the fragmentation. The carbon market institutions are bounded by the development of broader economic and political contexts.

Carbon market formation and design are the product of and are constrained by path-dependency (Knox-Hayes, 2009). The complex domestic processes and institutions of various carbon markets have not been rigorously discovered yet to explain the reasons for the divergence in characters and designs. By comparing the EU ETS and the K-ETS, I found that the political processes, structure, and institutional arrangement for energy management largely affected the character, design, and legitimacy of ETS. Due to the incumbent institutions, EU ETS is more legitimised compared to the K-ETS, which lacks stakeholder legitimacy due to uncertainty in the rules changes due to the political turnover. The ownership of the EU ETS lies with policy actors, while the K-ETS is controlled and managed by the strong government. Other measures may have been more coherent when considering the regulatory mode and policy style of South Korea. However, the K-ETS evolved to adapt to the existing institutions. In short, incremental change of climate policy was also relevant in the case of ETS developments at the national and supranational levels. The character and design of ETS only changed incrementally despite the Paris Agreement and the 2050 net-zero target setting. The divergent but incrementally changing EU ETS and K-ETS designs may not develop to be compatible to link in the Paris-era.

The case of the 2050 carbon neutrality setting of South Korea also reflected the incremental change of institutions in climate policy at the national level. Although the carbon neutrality target was set due to the political change involving the turnover of presidential and majoritarian politics, society resisted the radical change of institutions due to the incumbent political and energy structures, which have path-dependent roots from the developmental state. Although a transitioning economy, the country still embraces economic growth through industry development as in the past and they do not change the top-down governance practice with limited public participation.

The Role of Discourse and Power in the Institutional Change

Institutional work is defined as “actions through which actors create, maintain or disrupt institutional structures” (Beunen & Patterson, 2019, p.16-18). Institutions change through the interplay between actors and the institutional structure in environmental governance. The thesis demonstrated the dynamic interplay between structure and agency, which interacted to change climate policy and carbon markets in the Paris-era. Policy actors actively worked to either change or maintain institutions, while the structure also affects to restrict or modify the direction and pace of the change. The thesis contributed to describing the institutional work in the climate policy and carbon markets arena, especially highlighting how the actors, discourse, and powers are in effect of the process.

Carbon markets are socially constructed; they are created and change through social interactions (Knox-Hayes, 2010; MacKenzie, 2009). However, previous studies did not focus on describing the process of institutionalisation. By analysing discourses of multiple policy actors, the thesis described how climate policy and carbon markets are institutionalising through their dynamic interactions with the change of discourse and powers. Climate change discourses were analysed by many (Fleming et al., 2014; Fløttum, 2010; Hayes & Knox-Hayes, 2014; Risbey, 2008), however, there have been few empirical findings to demonstrate how the discourse is institutionalised except in the cases of the EU ETS reform (Fitch-Roy et al., 2020) and the UK climate policy (Gillard et al., 2017).

The thesis contributed to demonstrating how discourse and their powers work in the process of institutionalisation of climate policy and carbon markets in the Paris-era. In the case of global climate policy and carbon markets, I tried to analyse how discursive powers collided, contributing to the incremental change in institutions. Due to the power crash between the old and new powers of keeping economic competitiveness and climate emergency discourses, the Paris rules showed hybridisation of top-down and bottom-up rules. The carbon markets became fragmented with the emergence of polycentric mini-lateral linking.

In this vein, climate policy and carbon market evolution can be viewed as a discursive and institutional power battle between policy actors. The power struggle is present at both international and jurisdictional levels to explain how the climate policy and carbon markets evolve incrementally. At the jurisdictional levels, ETSs evolved to adapt to their institutional environments due to the incumbent structure and established powers in the political economy of the energy sector. For example, K-ETS was adopted under the dominant powers of neo-liberalism. However, the carbon market has a limited role in decarbonisation as the country does not change the national energy structure through energy and financial liberalisation. While the low carbon strategy was established under the Paris regime, it lacks long-term sights to complement its frequently changing political structure and institutions.

In the case of South Korea's 2050 net-zero target setting, I found a power collision between advocates with climate emergency discourse and the coalition that resists change to maintain old economic development narratives. The 2050 carbon neutrality target and strategy setting are contested due to the power divide between these policy actors. For instance, the Ministry of Environment coalised with civil society and the democratic party

to set the carbon neutrality target, while the Ministry of Trade Industry and Energy partnered with the energy and industry sectors and the conservative political party to hinder the transformation of the established energy and industrial structures and institutions.

Through the cases, I also found the limits of using the climate emergency discourse and net-zero framing to reach the Paris goals. Some pointed out the importance of creating a climate change narrative at the national level as the political conversation is a significant determinant of institutional outcomes (Dubash, 2021). Discourse change is important; however, it is not sufficient for institutionalisation. Many have already discussed the contentious political effects of using the climate emergency frame (Hulme, 2019; McHugh et al., 2021; Patterson et al., 2021), and have suggested deploying it with caution for sustainable governance and societal transformation. My thesis corroborates and extends the analysis of the gap between the discourse and institutionalisation. In the analysis of the global climate policy, the climate emergency discourse was not enough to overcome the discursive power of keeping economic competitiveness to change the rules of the game.

Climate policy and carbon markets are also affected by institutions established in the past. Climate policy evolved incrementally under existing domestic institutions through institutional adaptation and thus had a limited role in transforming the energy structure and society. At the national level, although the 2050 net-zero target and strategy was set, the agenda was not legitimised to transform society. The net-zero framing is used as a political declaration not leading to a real solution to stop climate change. In all, promoting the climate emergency discourse and the net-zero framing may not be the prescription to deal with climate change in the long run.

The Institutional Power within Broader Political and Economic Contexts

In the cases, I found the discursive power that resisted the transformation into a low-carbon society. At a broader scope, attempts to change climate policy and carbon markets through climate emergency discourse are controlled under the institutional power that comes from the established structures. Institutional power "concerns the ways that historically specific structures of meaning or the institutional setup of a polity or a policy area enhances or diminishes the ability of actors to promote their ideas" (Carstensen & Schmidt, 2016, p. 323). It is demonstrated as *power in idea*s that "become so accepted that their very existence may be forgotten" (Carstensen & Schmidt, 2016, p. 329). At the global level, policy changed incrementally due to the crash of the discursive power and rules of

keeping economic competitiveness, and institutions were also bounded by the broader social and economic context such as the global economic crisis and protectionism. At the national level, institutional power is reflected in the political structure and its path-dependent political economy to keep economic competitiveness with concerns for development and energy security. In the case of South Korea, the ETS has adapted to its domestic political and energy structure, and the net-zero agenda is restricted by state-centric institutions and the incumbent energy structure to embrace economic development through regulated low energy prices. The degree of energy and financial liberalisation had largely affected the divergence of ETS design.

Despite the Paris Agreement, the economic efficiency rule governs climate policy, and competitiveness concerns remain the priority. Climate change discursively poses threats to continuing development under capitalism, as economic growth has been dependent on burning fossil fuels. Hence, some argued that capitalist institutions must be fundamentally transformed to stop climate change confronting the power of capitalism (Kenis & Mathijs, 2012; McCright et al., 2016; Storm, 2009). On the other hand, others like Newell and Paterson (2010) asserted that "climate capitalism" is constructed through the evolution of climate policies and carbon markets, and McCarthy (2015) suggested the need for a societal shift towards renewable energy sources despite challenges in powers and political change within the capitalist world.

In all, the Paris Agreement and its discourse and powers have not institutionalised to overcome the old discourse and institutional powers at the global level. However, I conclude that the institutions are changing through dynamic actors, although the progress is incremental and fragmented. Climate policy and institutions are "layered", and they can lead to a significant change in the long run (Streeck & Thelen, 2005). However, the concern is the degree and pace of change. The layered institutions may not be sufficient, and the process may not be fast enough to stop climate change. The next challenge of the Paris period would be to discover how the globe develops a new institution that can overcome the institutional powers with social legitimacy while the scale and speed is an important concern.

7.2.2. Theoretical Contribution

The thesis is based on New Institutionalism theories, which "seek to elucidate the role that institutions play in the determination of social and political outcomes" (Hall 1996, p,936). Institutions are defined as "complex embeddings of schemas into resources and networks"

(Clemens & Cook, 1999), that endure and change over time. New Institutionalism seeks to observe how and why actors behave, which institutions affect their behaviour, and why institutions persist or change. However, the explanation of change through the critical juncture has not been well established, despite institutional analyses generally explaining change through external factors such as economic crisis or wars (Hall & Taylor, 1996). A "critical juncture" is the branching point from which historical development moves onto a new path (Hall & Taylor, 1996; Pierson 2000).

The thesis elaborates that institutions constitute actors (Meyer & Jepperson, 2000), demonstrating the institutional change that involves the relationship between institutions and actors and their asymmetries of power. Structures and actors are related as institutional structures "conflict so as to privilege some interests while demobilising others" (Hall & Taylor, 1996, p.937). The thesis employs new institutionalist thoughts and concepts in analysing climate policy and carbon market cases. The cases showed how institutions change gradually and incrementally through conflicts of actors and their power struggles and assess to what extent the climate emergency discourse and net-zero framing create a cleavage to the critical juncture.

Based on the New Institutionalism various analytical frameworks were utilised in the analysis. Institutional change is a complex process, and using multiple concepts facilitated understanding of the process by providing multiple aspects. Discursive institutionalism was adopted to explore how institutions change through actors, their discourse, and powers. I concluded that climate policy and carbon markets evolved incrementally from Kyoto to the Paris period due to the persisting discursive power of keeping competitiveness and under the institutional powers of established structures. The concept of institutional complementarity was used to compare the EU ETS and the K-ETS cases, demonstrating how carbon markets evolved adaptively to established institutions within different institutional arrangements. Finally, I explained how the South Korean 2050 carbon neutrality target and strategy setting process is path-dependent based on historical institutionalist thoughts and analysed that the strategy is not institutionalised to transform society due to the persisting powers in established institutions.

Overall, the thesis contributed to explaining the mechanism of institutional change. New Institutionalism theories are often criticised for their limits in explaining institutional change (Gorges, 2001). The cases of climate policy and carbon markets, and the 2050 carbon neutrality strategy setting all demonstrated path-dependency, which involves self-

reinforcing or positive feedback processes of the policy actors. The policy network resisted change due to their interests in increasing returns from already established structures (Pierson, 2000). Institutions are layered (Streeck & Thelen, 2005) or thickened through multiple overlapping and intersecting socio-spatial networks of powers (Clemens & Cook, 1999).

Human behaviour and the effects of institutions on the behaviour are complex and multi-faceted. Institutions are socially embedded, and they evolve as a mix or a bricolage of old and new, formal, and informal rules (Cleaver, 2001). Actors gather and apply existing institutions, creating a complex renewed institution. The study of climate policy and carbon markets should build upon an understanding of the complexity of institutions, recognizing that they are constructed and accumulated by multiple actors under diverse institutional contexts over time.

Discourse can enrich institutional analysis by providing more insights into how actors change institutions through interplay with the structures in climate policy. The change of discourses has complemented showing how institutions changed slowly and incrementally due to the collision in powers of old and new ideas. Mahoney and Thelen (2009) theorised "gradual institutional change", claiming that incremental shifts often can add up to fundamental transformations. By adopting the concept of discourse and power, the thesis demonstrated how the institutions were "layered" in climate policy (Streeck & Thelen, 2005). Layering is defined as "new elements attached to existing institutions gradually changing their status and structure" (Streeck & Thelen, 2005, p.31). Discourse change is not necessarily a radical institutional change; however, it can steer the way institutions layer to create a different configuration of the institution. The thesis opened a research agenda to search how incremental change leads to transformative institutional change that is required in the Paris-era.

7.2.3. Geographical Contribution: Climate Institutions in South Korea

Paris Agreement demands close attention to domestic climate policies. Addressing the national climate institutional structures, Dubash (2021) analysed the varieties of climate governance of large emitting countries: Australia, Brazil, China, India, South Africa, the US, and the UK. He found that climate institutions develop path-dependency due to national political institutions, international drivers, and bureaucratic structures (Dubash, 2021). In the study, the climate institutions were divided according to the extent of political polarisation, and whether the climate change narrative is embedded or mitigation centric.

The climate institutions were categorised into (1) *opportunistic institutions* that climate narratives are embedded in the sectors with low polarisation; (2) *unstable sectoral institutions* with embedded sectoral climate narrative and high political polarisation; (3) *unstable climate institutions* that have mitigation-centric framings but are contested by high political polarisation; and (4) *strategic climate institutions* with mitigation centric policy but showing a degree of climate consensus (Table 7.1).

The thesis corroborates that climate institutions develop by layering and adapting to domestic political institutions and bureaucratic structures. In addition, the thesis contributed to fill the geographical gap in the climate institutions analysis. It adds the South Korean climate policy case as demonstrating an "unstable climate institution" among the four categories (Table 7.1). South Korea is a transitioning country with its own institutions that involve polarised politics due to the majoritarian democratic structure. It is also mitigation centric, evidenced by the ETS implementation and the 2050 carbon neutrality agenda setting due to internal and external pressures. It implies that climate policies could be short-term and be prone to change or fail as in the cases of the US and Australia.

		IDEAS Dominant Climate Politics Narrative	
		Embedded	Mitigation Centric
INTERESTS Extent of Political Polarisation	Low	Opportunistic Climate Institutions E.g., India	Strategic Climate Institutions E.g., UK, Germany, China
	High	Unstable Sectoral Institutions E.g., South Africa, Brazil	Unstable Climate Institutions E.g., US, Australia

Table 7.1. Varieties of Climate Institutions (Dubash, 2021)

7.3. Limitations of the Thesis

The thesis was a qualitative study that included three cases of (1) global climate policy and carbon markets; (2) the EU ETS and the K-ETS; (3) the South Korea 2050 carbon neutrality target setting. The number of cases was limited due to time and resource constraints. The purpose of the project was to provide an in-depth insight into how climate policy and carbon markets are evolving in the Paris-era, by describing and discovering the reasons for their evolution. Since the study only deals with a limited number of cases, the findings may

not be generalisable. Other empirical findings of climate policies and carbon markets at different national and jurisdictional levels may enrich the understanding of the Paris regime as a whole and evaluate the extent to which they are institutionalised to a low-carbon world. Comparing institutions of various institutional structures, including both developing and developed countries, could also enrich insights into the institutional adaptation and evolution of climate policy in the Paris-era. However, there is a large imbalance of information between developed and developing countries regarding climate policy adoption and implementation.

Although I compared the K-ETS to the EU ETS to analyse institutional complementarity under different institutional environments, I was not able to study the process of the 2050 net-zero target setting of the EU polity, as parallel to the South Korean case. The case comparison would have enriched the thesis to explain divergent climate policy and institutions comprehensively. During data collection, I completed most interviews with EU policy actors in 2019, while most interviews with South Korean policy actors were conducted in late 2020. The South Korea 2050 carbon neutrality setting case was discovered as a theme due to the interview period. The period coincided with the time when the country was setting the contested 2050 target to submit the NDC and the LEDS to the UNFCCC at the end of the year 2020. The study participants constantly raised the controversial 2050 net-zero setting process during the interviews, which became an important theme at a later stage of the project.

I designed the study to be interactive and reflexive through the participants' interviews. The thesis was based on the view that climate policy and carbon markets are socially constructed, where the dynamic actors are constantly establishing and changing institutions through their discourses. Although the interviews were semi-structured, I allowed the participants to bring up new topics for discussion and facilitated elaboration on topics that were perceived as important during the interviews. When asked how power is demonstrated and how climate policy and carbon markets are institutionalising, participants spoke of their perceptions and thoughts in a subjective manner.

I acknowledge that the study itself is subjective, and analysis cannot be independent of the author's perceptions and experiences. As a South Korean national who was educated in the West, my identity, attitude, and personal characteristics, including my political position, cultural background, and career experiences, may have influenced the entire process of constructing knowledge. For instance, I collected policy documents and selected study

participants based on my perception of who is important and influential in the case studies. Moreover, some interviewees were recruited based on my knowledge and the networks built during my earlier career. Before starting my PhD project, I worked in the Korean government (Ministry of Environment) in the division that mainly worked to set rules and implement K-ETS in 2015 and had relevant experience in stakeholder engagement and international cooperation activities.

Through the project, I could only capture a snapshot of the constantly changing global climate policy and carbon markets in a limited time. For example, after data collection during 2020-2021, there were significant changes, including the change in the president and composition of political parties through elections in South Korea in 2022. These changes led to significant shifts in national energy plans, which could drastically alter the political, economic, and social contexts. Additionally, the COVID-19 pandemic outbreak during the data collection period may have influenced the ideas and perceptions of actors, as well as the broader institutional contexts. A longitudinal study can be beneficial to understand the dynamic but slow and complex institutionalisation process of the Paris regime in the long run. Hence, the process of institutional layering may take a long time to demonstrate the change closer to reality.

Finally, the thesis identified the gap between discourse, framing, and institutions, but did not go beyond to suggest what steps should be taken to close the gap and how. The next research agenda is to explore how to legitimise climate policy and carbon markets to be institutionalised in practice, which I will elaborate more on Section 7.5.

7.4. Implications for Policy

Institutions of climate policy evolve incrementally. We should find ways to layer climate policy more legitimately at both the global and national levels to move into a low carbon society. It is crucial to construct institutions on the right path as the institutions thicken because the policy domain becomes increasingly institutionalised over time (Clemens & Cook, 1999). For example, Rosenbloom et al. (2019) argued that climate policy should move towards stabilising the low carbon transition path that weaves throughout multiple fields in a broader transformative agenda.

Carbon markets represent a compromise between climate action and economic development under institutional powers. Hence, many countries aim to use the Article 6 market mechanisms of the Paris Agreement to achieve their goals. As a pioneer in climate policy, the EU ETS is the model that is promoted for ETS implementation. However,

developing countries should be cautious when adopting the ETS because they may have a state-centric structure and government-led national energy management that may undermine the character and functioning of the ETS. The carbon market or ETS may not be the only solution for low carbon transformation, and there is a lack of information on how the market mechanism could work adaptively or complementarily with local institutions in developing or transitioning countries. More discussion is needed to find ways to adapt ETS to fit its institutions rather than copying the promoted design.

Beyond the ETS, the EU continues to demonstrate “leadership by example” in the Paris-era (Oberthür & von Homeyer, 2022). The Paris regime calls for a policy mix that is complementary to each other to deal with long emergency (Patterson et al., 2021; Rogelj et al., 2021). Through the European Green Deal, the EU evolved its climate policy to complement its long-term polycentric political process through government interventions and investments. The EU climate governance is evaluated to be enhanced in scope and strength through the thickening of diverse economic, regulatory, procedural, and informational instruments (Oberthür & von Homeyer, 2022). K-ETS adapted to its fast-changing institutional structure, however, it has a challenge to reach coherence in the broader climate policy with long-term signals that can give certainty and legitimacy to policy stakeholders. It also needs to achieve more social acceptance to transform the national energy structure on the pathway to a low-carbon society. Institutions should be layered to construct institutions that can deal with climate change in the long-term.

Moreover, parties should caution when developing or transitioning countries set net-zero targets, as it may be a mere declaration rather than a true institutionalisation towards a low-carbon society. A net-zero declaration should not be a free pass for the Paris Agreement, but it demands close monitoring and evaluation for its implementation, considering domestic institutional adaptation. For instance, South Korea as a transitioning country still lingers path-dependency from the developmental state, prioritising economic development over climate concerns. South Korea is not likely to decarbonise under the Paris regime as opposed to its net-zero declaration, and the pathway is subject to political swings due to the institutional structure of a strong state and majoritarian politics, and incumbent energy political economy.

However, the UNFCCC governance does not ensure accountability for the net-zero implementation or reaching the Paris goals. Raiser et al. (2022) have argued that the current capacity and resources of the UNFCCC governance lack procedures to assess the

adequacy of national pledges and review progress. The review mechanism is not sufficient to drive policy changes, but the change of political context steers the change. A robust governance system for pledge and review should be established through the UNFCCC process to follow up on institutionalisation progress and make a collective achievement of the Paris goal.

7.5. Future Studies

Giddens (2011) stressed the need to work with institutions that already exist and in ways that respect democracy when dealing with climate change. In the thesis, I identified a gap between what discourse calls for and what is done in practice and showed that social legitimacy is a hinderance for institutionalisation toward a low carbon society. Legitimacy is a key element in the institutional change of climate policy and carbon markets, as the process requires society to justify or accept the institution as appropriate.

> *Legitimisation involves institutionalisation of formal and informal rules or practices that become authoritative or understood to obligate by members addressed. (Bernstein, 2005, p. 156)*

As I found that the discursive power of keeping economic competitiveness and the institutional power hinders transformation to a low-carbon society, further research needs to focus on ways to contest and overcome incumbent powers to legitimise new institutions that are more sustainable. More work is needed to understand the gap between discourse and institutional change, and how to close it.

The scale and pace of change are additional challenges under the Paris regime. Institutions of climate policy change slowly and incrementally, which does not align with the speed required. The speed and geographical spread of low carbon transformation are not sufficient to avoid dangerous climate change (Leggewie & Messner, 2012). Heffron and McCauley (2018) highlighted that a just transition to a low carbon society should consider being fast enough to reach the Paris goals. More discussion is needed to overcome climate policy inertia and accelerate climate actions (Figueres et al., 2017). Transitioning into a low carbon society is very difficult and slow, and just and legitimate processes of climate policy may take further time. Future studies should explore how to accelerate the low carbon transition pathway, making it legitimate and just, while considering its broad scale and time constraints.

Moreover, there is a growing role of the UNFCCC governance in orchestrating the pledge and review process that is both legitimate and effective (Bäckstrand & Kuyper, 2017). More research is needed to suggest a governance framework that is effective, efficient, and yet just to track the progress towards NDCs and net-zero achievements at national levels.

Bailey et al. (2011) analysed that carbon market is a technocratic project that does not deal with structural causes, is not fully institutionalised or legitimised by society to tackle climate change. I also found that the carbon market is still not legitimised to the stakeholders in South Korea. The barrier lies in the low social acceptance to transform the national energy system based on its persisting strong political economy. The 2050 carbon neutrality target and its strategy also lacked legitimacy in South Korea due to the incumbent energy structure and low social acceptance. It implies that other developing countries might have low readiness to institutionalise the carbon markets and the net-zero strategy to transform into a low carbon society despite the declaration to implement them.

I suggest future research to discover how different institutional architectures affect ETSs development and functioning. More attention should be made to discuss institutional complementarity regarding ETS design, rather than transplanting an established model, especially in countries with strong regulatory modes considering their political and economic structure and governance tradition. Social legitimacy and institutional complementarity are intertwined:

> *To be legitimate, rules and institutions must be compatible or institutionally adaptable to existing institutionalised rules and norms already accepted by a society. (Bergenstein, 2005, p.156)*

Overall, rather than promoting the discourse of climate emergency and the net-zero framing or suggesting a universal policy tool like ETS or the green deal, more constructive discussion should be made on how institutions can work complementarily with already established institutions. Mutually reinforcing institutions can accelerate change, which is needed to tackle the emergent yet complex problems like climate change.

7.6. Conclusion

Going back to the overarching research question: **"How are climate policy and carbon markets evolving in the Paris period, and to what extent are they institutionalised to transform into a low carbon world?"** I answer that climate policy and carbon markets are evolving in a slow and complex manner, although efforts have been made to change

discourse and framing, and policy adoption. I conclude that the world is not institutionalising to transform into a low carbon world within the scale and pace of change as the Paris Agreement demands.

The thesis empirically found that global climate policy and carbon markets are evolving incrementally through the layering of institutions. I found reasons for the incremental and fragmented evolution in the power struggles between old and new actors and their ideas. Although the Paris regime emerged with the climate emergency discourse, the discourse change could not lead to a radical institutional change to reach a low carbon world. The climate policy and carbon markets become fragmented during the Paris-era.

The evolution of climate policy and carbon markets is limited by structural constraints, as the established institutional structures hold “power in ideas”. Domestic politics and institutional arrangements, including energy sector management, are determinants of the different characters and legitimacy of the EU ETS and K-ETS. Therefore, adopting the theoretical model of ETS did not guarantee low carbon transformation. Path-dependency and the incumbent political economy lead to the layering of institutions into established ones.

There is a gap between the net-zero declaration and institutionalisation toward a low carbon society at the national level. Although South Korea has set the 2050 carbon neutrality target and strategy, the agenda was contested internally, and the pathway is prone to political swings due to political structure and incumbent political economy. The thesis provided an empirical case to review the national institutionalisation process under the Paris regime, especially when there is an information deficit from developing or transitioning countries.

Theoretically, the thesis contributed to explaining the process and mechanism of institutional change by demonstrating the dynamic interaction between actors and the structure. It illustrated how the process is complex and multi-faceted, suggesting the need to adopt diverse theoretical frameworks and concepts to understand complex problems like climate policy and carbon markets. Actors’ discourse and the concept of ideational power complement to explain the institutional change, however, the change in discourse may not lead to a radical change but a gradual and nuanced one.

In this light, more attention should be paid to the social and political dimensions of climate policy and carbon markets: to close the gap between discourse and institutionalisation; to

examine institutional complementarity to established institutions at national levels when adopting policies; and to develop a robust governance framework to monitor and evaluate the institutionalisation of national pledges under the Paris regime.

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Appendix A. Information Sheet and Consent Form Samples (English, Korean)

Institutionalisation of Carbon Markets in the EU and South Korea and Prospects for the Future Linkage

You are being invited to take part in a research project on carbon markets and their linkage in the EU and South Korea. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and decide whether or not you wish to take part. Please reply to Ruth Jihyung Joo at eejj@leeds.ac.uk or call +44(0)7366079469 if you consent and accept to take part in the research.

- **What is the purpose of the project?**

The aim of the research is to understand how institutions and political forces affect adoption and change of carbon markets and their linkages, in order to provide insights on the future attempts to link greenhouse gas Emissions Trading Schemes (ETSs). The research explores structures and processes involved in the institutionalisation of EU ETS and the South Korea ETS, and seeks to understand different actors' role in prospective linking of the two systems.

- **What do I have to do?**

Interviews with more than 20 actors in the carbon markets of both EU and South Korea will be conducted as a part of the research. Taking part in the research is entirely voluntary and if you do decide to take part, a face-to-face interview will be scheduled at your convenient time and location. The interview can also be done via phone or over Skype. You will be asked to answer open-ended questions about carbon markets and their possible linkages and the interviews are not expected to last no more than an hour. The interview could be audio-recorded upon your consent.

The interview will be an informal discussion designed to gather your professional and personal opinions. It is hoped that this work will give an opportunity for you to discuss, which may have an influence in directions of future climate change policy and actions. You will always have the right not to comment or to end the discussion at any point.

- **What will happen to the results of the research?**

The results of the research will be used in analysis and publication of my PhD thesis and related academic publications. All personal information that we collect during the research will be kept strictly confidential and will be securely stored at the University of Leeds for up to 5 years. We will take steps wherever possible to anonymise the data and only the immediate research team has access to your identity. In any publication you will be described in terms of your role (e.g. Director, Manager, etc.) and the sector of your organisation (e.g. Government, NGO etc.) so that you will not be identified. If you decide you do not want your interview to be included in the research findings then you will need to let me know before the initial analysis has finalised (before Dec. 31st 2020).

Thank you for taking time to read through the information. Please don't hesitate to ask me if there is anything that is not clear or if you would like more information.

Ruth Jihyung Joo

Postgraduate Researcher
Sustainability Research Institute
University of Leeds
11.115 SEE LS
+44(0)7366079469
eejj@leeds.ac.uk

Consent to take part in **"Institutionalisation of Carbon Markets in the EU and South Korea and Prospects for the Future Linkage"**	Add your initials next to the statement if you agree
I confirm that I have read and understand the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.	
I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences until December 31st, 2020. In addition, should I not wish to answer any particular question or questions, I am free to decline. Lead Researcher Contact: Ruth Jihyung Joo Sustainability Research Institute University of Leeds 11.115 SEE LS +44(0)7366079469 eejj@leeds.ac.uk	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. I understand that my responses will be kept strictly confidential.	
I agree for the data collected from me to be stored and used in relevant future research in an anonymised form.	
I understand that relevant sections of the data collected during the study, may be looked at by auditors from the University of Leeds where it is	

relevant to my taking part in this research. I give permission for these individuals to have access to my records.	
I agree to take part in the above research project and will inform the lead researcher should my contact details change during the project and, if necessary, afterwards.	

Name of participant	
Participant's signature	
Date	
Name of lead researcher	
Signature	
Date	

한국과 유럽연합(EU) 탄소시장의 제도화와 향후 연계 전망 연구

한국과 유럽연합(EU)의 탄소시장과 그 연계에 관한 연구를 위해 전문가 면담을 요청 드리고자 합니다. 연구의 목적과 절차는 아래와 같습니다. 면담을 허락하신다면 주지형 연구원에게 이메일 (eejj@leeds.ac.uk) 혹은 전화 (010-4639-0929) 로 회신해 주시기 바랍니다.

- **연구목적**

이 연구의 목표는 탄소시장과 같은 기후변화 정책의 도입과 발전, 제도변화 및 국제연계에 정치, 사회적 요인이 어떻게 영향을 미치는지 고찰하는 것입니다. 특히 이 연구는 한국과 유럽연합 탄소시장의 구조와 그 제도화 과정을 조사하고 서로 다른 두 제도의 연계를 위한 행위자들의 사회정치적인 역할을 탐구하는데 초점을 둡니다.

- **면담절차**

본 연구를 위해 한국과 유럽연합 기후변화 정책 분야의 전문가 약 40 여명을 면담하고자 합니다. 참여를 허락하시면 편하신 시간에 일대일 혹은 화상전화 방식으로 한 시간 내외의 면담을 진행할 예정입니다. 기후변화 정책과 탄소시장, 그 연계를 중심으로 전문가의 견해와 개인적인 의견을 여쭙기 위해 설계된 면담이기에 격식 없이 열린 질문을 드릴 예정입니다. 대답하고 싶지 않은 질문에는 응하지 않을 수 있고, 언제든지 면담을 중단하거나 취소할 수 있습니다. 아울러 허락해 주신다면 심층분석을 위해 면담내용을 녹음하고자 하오니 양해 부탁드립니다. 향후 국제 기후변화 정책과 발전에 기여할 수 있는 만남이 되길 기대합니다.

- **면담결과는 어떻게 되나요?**

면담 내용은 분석을 거쳐 주 연구자의 박사학위 논문과 관련 학술지 논문에 반영되어 발간될 수 있습니다. 모든 개인정보와 내용은 비밀이 보장되며, 영국 리즈대학교의 보안과 관리를 통해 최대 5 년까지 안전하게 보호됩니다. 모든 정보는 익명으로 보관되며, 주 연구자를 포함해 세 명으로 구성된 연구팀만 면담자 정보에 접근할 수 있습니다. 논문 발간시에는 면담자가 종사하는 기관의 분야(예: 공공분야, NGO, 기업 등)와 직급 (예: 매니저, 연구원 등)에 한해 공개될 수 있으며, 면담자가 특정될 수 있는 관련 정보는 공개되지 않습니다. 면담 후에 그 내용을 연구 결과물에 포함하고 싶지 않으시다면 1 차 결과분석이 끝나기 전 (2021 년 8 월 31 일까지)에 주 연구자에게 연락하면 됩니다.

귀한 시간에 정보를 확인해 주셔서 감사합니다. 혹시 연구나 전문가 면담 관련 궁금하신 사항이 있거나 더 많은 정보를 원하시면 언제든지 연락해 주십시오. 감사합니다.

주지형 연구원 (박사과정)

영국 리즈대학교 환경대학원 지속가능성연구소

Sustainability Research Institute, University of Leeds

(+82) 010- 4639-0929 eejj@leeds.ac.uk

https://environment.leeds.ac.uk/see/pgr/2170/ruth-jihyung-joo

“한국과 유럽연합(EU) 탄소시장의 제도화와 향후 연계 전망” 연구를 위한 전문가 면담 동의서	이니셜 서명
나는 연구에 대한 정보지를 읽고 그 내용을 이해했으며, 연구에 대해 질문할 수 있는 기회를 가졌음을 확인합니다.	
나는 자발적으로 이 연구 참여를 결정하였고, 이유를 설명할 필요없이 2021 년 8 월 31 일 이전에 연구참여를 언제든지 취소할 수 있으며, 특정 질문이나 여러 질문들에 대답하고 싶지 않으면 하지 않아도 되는 것을 알고 있습니다. 주 연구자 연락처: 주지형 연구원 (박사과정) 영국 리즈대학교 환경대학원 지속가능성연구소 (+82) 010- 4639-0929 eejj@leeds.ac.uk	
나는 내 익명 면담정보에 연구진이 접근할 수 있도록 허락합니다. 내 이름은 면담 내용과 연결되지 않으며, 발간되는 결과물에서 면담대상자를 식별할 수 없고, 내 정보에 대한 비밀이 보장되는 것을 알고 있습니다.	
내 면담내용이 익명 상태로 보관되고, 향후 연구 분석과 결과물 발간에 사용될 것에 동의합니다.	
내 면담내용이 필요 시 영국 리즈대학교 감사과정에서 검토될 수 있다는 점을 이해하고 감사관련 인원들이 그 정보에 접근할 수 있도록 허락합니다.	
나는 위 연구(전문가 면담)에 참여할 것이며 연구 진행 중, 혹은 필요시 향후 연락처가 바뀌면 주 연구자에게 알릴 것을 동의합니다.	

면담자 성명	
사인	
날짜	
주 연구자	
사인	
날짜	

Appendix B. Interview Guide Samples (English, Korean)

	Time (mins)
Pre-Interview Checks	

"Before we start, there are just a few things that I'd like to confirm with you..."
• Purpose of interview
  o Interview topic (carbon markets and their linkages) and Importance
  o Reference to expertise
• Length: Approximately 1 hour
[If need to shorten]: No problem can tailor to suit
• Request permission then place recorder on table/ next to the person
• Go over the informed consent and privacy notice
Confirm participant happy to continue and check if any questions before doing so
	5

Introduction and Warming up	
"Tell me a little bit about your background and your current role…" • What are the current priorities of your organisation and department? What projects are you working on? • What aims do you/ does your team/ department have in the area of carbon markets and their linkages? • What is your role in helping to achieve these objectives?	5
Interview	
[Adoption] **1. How was the ETS adopted?** a. How did the problem came about and how was it perceived? b. What were the policy options and why was ETS preferred?	5

c. In what ways/to what extent did the political environment affect ETS adoption? d. Who were the actors (entrepreneurs) and what enabled adoption?	
[Implementation] **1. How do you evaluate the ETS implementation (2005-2019),** **What has driven the stability/change of the policy?** a. What do you think about the structural reforms and interventions EU ETS has gone through after early phases? **2. What are the rules of the game (formal decision making and informal rules and routines) in ETS?** a. How do you think the ETS is accepted (legitimised) to actors? *"**Carbon Market** involves trading of allowances of ETS or credits through baseline-credit scheme like Kyoto Mechanism. So far, the EU ETS has been linked to the Kyoto mechanism, Norway, and Switzerland carbon markets."* **3. What are your views on the carbon market linkage** (how it worked or the role of it)? **4. What do you think is enabling or hindering the carbon market linkages?**	15
[Future] **1. In light of Paris Agreement, Do you think the window of opportunity is opened to make a "radical change" in carbon markets in post-2020?** a. Do you think there will be more carbon market linking in the future (post-2020)? Why do you say so? **2. Can you describe how the change might happen?** a. What will be the role of carbon markets and linking in achieving future climate goals in the Paris-era? b. Who are the main actors (entrepreneurs) that drive the change and why? **3. What are the (dominant) ideas or discourse that enable change?** **4. Where do you think the power comes from and How does that affect the change?** *"Power refers to the mobilisation of resources and/or the influence to the policy decision making"*	20

5. What are the Rules of the game (formal decision making and informal rules and routines) in driving the future change? **6. Do you have views or comments on future prospects of the EU-KOR linkage?**	
Closing	
"Is there anything that you'd like to add?" • Any points to add	2
"Is there anyone else who you think that I should talk to?" • Why this person/ these people are worth talking to • Ask for contact details	2
"Thank you for your participation" • Ensure they are clear on the ability to re-contact and ask questions anytime	1
	Total 55-60

	Time (mins)
Pre-Interview Checks	
• 연구의 목적 o 면담주제와 중요성 (도입과정, K-ETS 운영평가, 향후 국제 탄소시장 연계) • 면담시간 약 1 시간, 필요시 1 시간 미만으로 줄일 수 있음 **녹음기 사용**에 대한 허가, 확인 후 녹음기 사용 • **연구동의서** 내용 반복 후 한 번 더 면담진행 여부 확인	5
Introduction and Warming up	
"현재 하시는 일에 대해 조금 알려주세요" • 현재 일하시는 곳에서 요새 우선순위에 있는 일들은 무엇인가요? 어떤 프로젝트가 진행되고 있나요?	5
Interview	
[제도 도입] **2. 한국 ETS 는 어떻게 도입되었나요? 왜 도입되었다고 생각하세요?** a. 문제는 어떻게 도래했고, 어떻게 인식되었나요? b. 어떠한 정책들이 선택 가능했고 그 중 왜 ETS 가 선택되었나요? c. 어떻게/어느정도로 정치적인 상황이 도입에 영향을 주었나요? d. ETS 도입에 영향을 준 주요 행위자/조직은 누구이며 어떻게 도입을 가능하게 했나요? e. 도입과정의 정치적인 힘들이 제도 디자인에 어떤 영향을 미쳤나요?	5
[제도 집행] **5. 지금까지의 K-ETS 를 어떻게 평가하나요, 무엇이 변화를 야기했나요?** a. ETS 특히 3 기의 구조적인 변화 (제 3 자참여 등 법개정, 할당계획 변경 등)에 대해 어떻게 생각하나요?	15

6. 우리나라 ETS 제도의 '게임의 법칙'이 어떤 것이 있을까요? (법 외에 행위자들이 공유하는 상식이나 비공식적인 법칙, 관습, 문화 등) **또 이것들이 EU ETS 와 어떻게 다를까요?** a. 행위자들에게 ETS 는 어떻게 받아들여졌나요? *"탄소시장은 ETS 나 CDM 같은 상쇄메커니즘을 포함한 시장메커니즘으로 우리나라도 교토메커니즘과 연계를 했고 EU ETS 도 다양한 국제연계 시도들이 있었는데요"* **7. 한국 탄소시장의 국제연계에 대해 어떻게 생각하나요?** - EU 와는 탄소시장에 대한 입장이 많이 다른데 왜 그럴까요? - **무엇이 탄소시장 연계를 가능하게 하고 혹은 장애물이 되게 할까요?**	
[미래] **7. 2015 년 파리협정 이후 post-2020 신기후체제 하에 국제 탄소시장에 혁신적인 변화가 있을 것이라 예상하시나요** a. (국제) 2020 년 이후 더 많은 탄소시장 연계가 있을까요? 왜 그렇게 생각하세요? b. (우리나라) 신기후체제 목표달성에 국제 탄소시장 연계가 어떤 역할을 한다고 생각하세요? c. (국제) 파리조약 탄소시장(Article 6 6.2 항의 ITMO, 6.4 항의 SDM)에 대해 어떻게 생각하세요? d. (우리나라) 신기후체제 탄소시장 활용을 생각하고 있다고 들었어요. 진행상태나 향후 전망을 아시는지요? **8. 우리나라 신기후체제 하에 탄소시장의 변화를 만들어가는 주된 아이디어나 담론은 무엇인가요?** **9. 변화를 가져오는 힘은 어디서 나오나요? (힘은 자원조달에 대한 것이 될 수도 있고 정책 결정에 영향을 주는 것이 될 수도 있습니다)**	20

10. 우리나라 배출권거래제/탄소시장 게임의 법칙이 이전과 다르게 변화할 거라고 생각하세요? **11. 한국과 유럽의 ETS 연계에 대해 어떻게 생각하세요?**	
Closing	
• 혹시 덧붙이고 싶은 이야기가 있으신가요?	2
• 혹시 제가 만나서 면담하면 좋을 것 같은 사람을 아세요?	2
연구참여에 진심으로 감사드립니다. 제가 향후 결과물 관련해 편찬 시 연락 드리겠습니다. 그간 혹시라도 궁금함 사항이 생기면 언제든지 연락 주십시오.	1
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